installation, start-up and service instructions

SINGLE PACKAGE ROOFTOP ELECTRIC HEATING/ELECTRIC COOLING UNITS

558D
Sizes 036-072
3 to 6 Tons

Cancels: II 558D-36-4 II 558D-36-5
2/1/99

IMPORTANT — READ BEFORE INSTALLING

1. Read and become familiar with these installation instructions before installing this unit (see Fig. 1).
2. Be sure the installation conforms to all applicable local and national codes.
3. These instructions contain important information for the proper maintenance and repair of this equipment. Retain these instructions for future use.

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SAFETY CONSIDERATIONS

Recognize safety information. This is the safety-alert symbol (⚠). When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury.

Understand the signal words — DANGER, WARNING, and CAUTION. These words are used with the safety-alert symbol. Danger identifies the most serious hazards which will result in severe personal injury or death. Warning indicates a condition that could result in personal injury. Caution is used to identify unsafe practices which would result in minor personal injury or product and property damage.

⚠ **WARNING:** Before performing service or maintenance operations on unit, turn off main power switch to unit. Electrical shock could cause personal injury.

1. The power supply (volts, phase, and hertz) must correspond to that specified on unit rating plate.
2. The electrical supply provided by the utility must be sufficient to handle load imposed by this unit.
3. Refer to Locate the Unit section on page 3 and Fig. 2 for locations of electrical inlets, condensate drain, duct connections and required clearances before setting unit in place.
4. This installation must conform with local building codes and with NEC (National Electrical Code) or NFPA (National Fire Protection Association) 54 TIA-54-84-1. Refer to Provincial and local plumbing or wastewater codes and other applicable local codes.
5. Approved for outdoor installation on wood flooring or on class A, B, or C roof covering materials.

INSTALLATION

Unit is shipped in the vertical airflow configuration (see Fig. 1). To convert to horizontal discharge, remove horizontal duct opening covers. Using the same screws, install covers with insulation-side down (facing outside) over vertical duct openings on the unit. Seals around duct openings must be tight.

All units can be connected into existing duct systems *that are properly sized and designed to handle an airflow of 300 to 500 cfm per each 12,000 Btuh of rated cooling capacity.*

NOTE: When installing any accessory item, see the manufacturer's installation instructions packaged with the accessory. A qualified installer or agency must use only factory-authorized kits or accessories when modifying this unit.

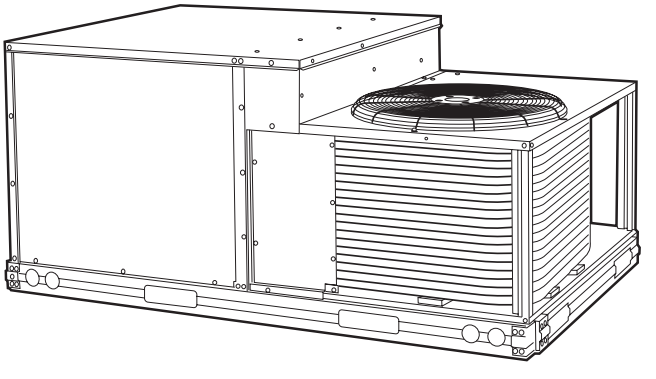


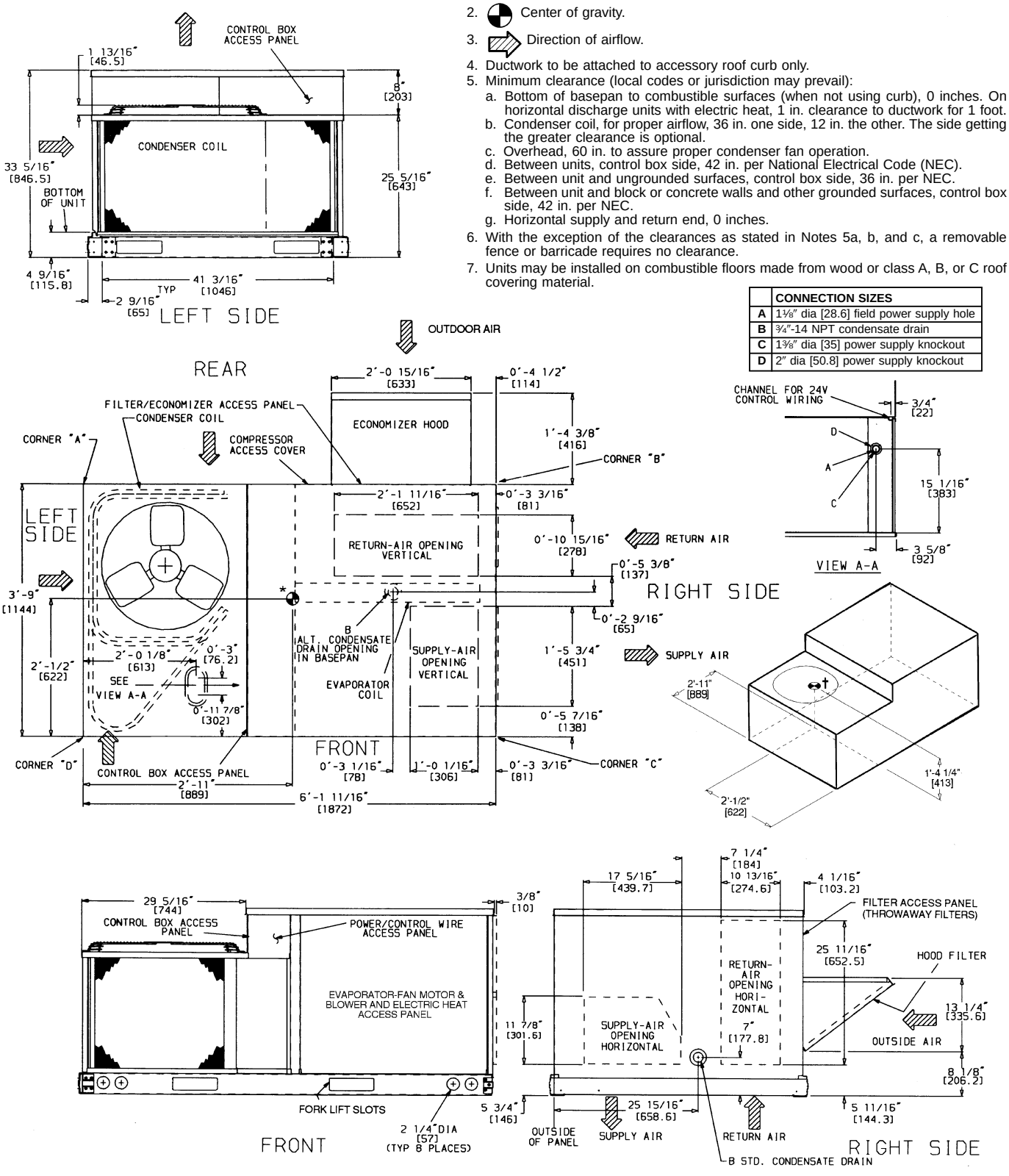
Fig. 1 — Typical Unit

*Indicates horizontal center of gravity.
†Indicates vertical center of gravity.

NOTES:

1. Dimensions in [ ] are in millimeters.
2. Center of gravity.
3. Direction of airflow.
4. Ductwork to be attached to accessory roof curb only.
5. Minimum clearance (local codes or jurisdiction may prevail):
   a. Bottom of basepan to combustible surfaces (when not using curb), 0 inches. On horizontal discharge units with electric heat, 1 in. clearance to ductwork for 1 foot.
   b. Condenser coil, for proper airflow, 36 in. one side, 12 in. the other. The side getting the greater clearance is optional.
   c. Overhead, 60 in. to assure proper condenser fan operation.
   d. Between units, control box side, 42 in. per National Electrical Code (NEC).
   e. Between unit and ungrounded surfaces, control box side, 36 in. per NEC.
   f. Between unit and block or concrete walls and other grounded surfaces, control box side, 42 in. per NEC.
   g. Horizontal supply and return end, 0 inches.
6. With the exception of the clearances as stated in Notes 5a, b, and c, a removable fence or barricade requires no clearance.
7. Units may be installed on combustible floors made from wood or class A, B, or C roof covering material.

	CONNECTION SIZES
A	1⅛″ dia [28.6] field power supply hole
B	¾″-14 NPT condensate drain
C	1⅜″ dia [35] power supply knockout
D	2″ dia [50.8] power supply knockout



UNIT	STD UNIT WEIGHT		ECONOMIZER WEIGHT				CORNER WEIGHT (A)		CORNER WEIGHT (B)		CORNER WEIGHT (C)		CORNER WEIGHT (D)	
			DURABLADE		PARABLADE									
	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg
558D036	365	165.6	34	15.4	42	19.1	126	57.2	89	40.4	111	50.3	39	17.7
558D048	375	170.1	34	15.4	42	19.1	128	58.1	90	40.8	114	51.7	43	19.5
558D060	395	179.2	34	15.4	42	19.1	132	59.9	94	42.6	120	54.4	49	22.2
558D072	470	213.2	34	15.4	42	19.1	148	67.1	103	46.7	155	70.3	64	29.0

Fig. 2 — Base Unit Dimensions

I. LOCATE THE UNIT

A. Clearance

Maintain clearance around and above unit to provide minimum distance from combustible materials, proper airflow, and service access (see Fig. 2 and 3).

Minimum clearance to combustibles is 0 in. on all sides.

Minimum clearance to block walls or any other grounded surface is 42 in. on all sides.

Minimum clearance of 36 in. should be provided on side with outdoor-air intake, if unit is so equipped.

Minimum clearance between unit and other electrically live parts is 48 inches.

Do not install unit in an indoor location. Do not locate unit air inlets near exhaust vents or other sources of contaminated air.

Although unit is weatherproof, guard against water from higher level runoff and overhangs.

Slab mounted units should be at least 4 in. above the highest expected water, flood and runoff levels. Do not use the unit if it has been under water.

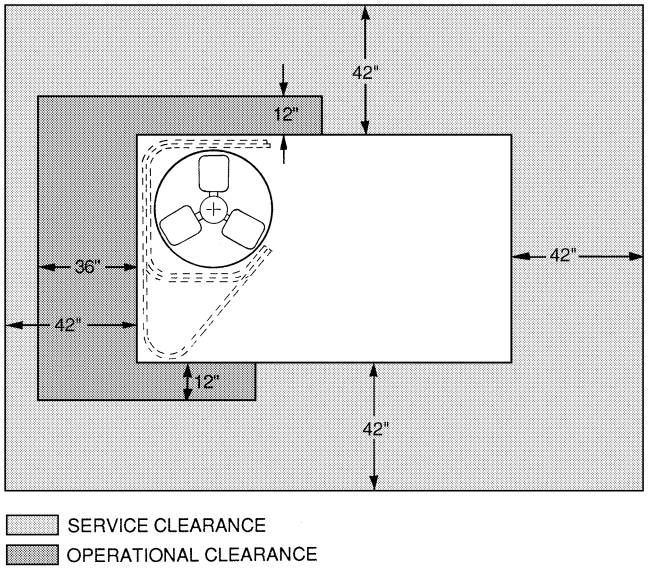


Fig. 3 — Service and Operational Clearances

B. Roof Curb Mount

Assemble and install accessory roof curb in accordance with instructions shipped with curb. See Fig. 4. Install insulation, cant strips, roofing felt, and counter flashing as shown. *Ductwork must be attached to curb.* If electric or control power is to be routed through the curb, attach the accessory thru-the-bottom connections to the basepan in accordance with the accessory installation instructions. Accessory electric connections must be installed before unit is in place on roof curb.

IMPORTANT: The gasketing of the unit to the roof curb is critical for a watertight seal. Install gasket with the roof curb as shown in Fig. 4. Improperly applied gasket can also result in air leaks and poor unit performance.

Curb should be level. Unit leveling tolerances are shown in Fig. 5. Correct leveling tolerance is necessary for unit drain to function properly.

C. Slab Mount (Horizontal Units Only)

Provide a level concrete slab that extends a minimum of 6 in. beyond unit cabinet. Install a gravel apron in front of condenser-coil air inlet to prevent grass and foliage from obstructing airflow.

NOTE: Horizontal units may be installed on a roof curb, if required.

II. UNIT DUCT CONNECTIONS

On vertical units, secure all ducts to roof curb and building structure. *Do not connect ductwork to unit.* On horizontal units, duct flanges should be attached to horizontal openings and all ductwork should be secured to flanges.

If a plenum return is used on a vertical unit, the return should be ducted through the roof deck to comply with applicable fire codes.

A minimum clearance is not required around ductwork. Cabinet return-air static shall not exceed −0.20 in. wg with PARABLADE economizer, −0.35 in. wg with Durablade economizer, or −0.45 in. wg without economizer.

NOTE: Connection must be made to roof curb before unit is set in place.

III. RIG AND PLACE UNIT

Inspect unit for transportation damage. File any claim with transportation agency. Keep unit upright and do not drop. Spreader bars are not required if top crating is left on unit. Rollers may be used to move unit across a roof. Level by using unit frame as a reference. See Table 1 and Fig. 6 for additional information. Operating weight and maximum weight are shown in Table 1 and Fig. 6.

Lifting holes are provided in base rails as shown in Fig. 6. Refer to rigging instructions on unit.

IMPORTANT: If unit has forklift protection skids, be sure to remove forklift protection skids from under unit before setting unit in place.

A properly positioned unit will have the following clearances between unit and roof curb: ¼-in. clearance between roof curb and base rails on each side and front of unit; 1$\frac{5}{32}$-in. clearance between roof curb and rear of unit. See Fig. 4, Views A-A and C-C.

After unit is in position, remove shipping materials and rigging skids.

ROOF CURB ACCESSORY	"A"	UNIT SIZE
CRRFCURB001A00	14″ [356]	558D036-072
CRRFCURB002A00	24″ [610]	

NOTES:
1. Roof curb accessory is shipped unassembled.
2. Insulated panels.
3. Dimensions in [ ] are in millimeters.
4. Roof curb: galvanized steel.
5. Attach ductwork to curb. (Flanges of duct rest on curb.)
6. Service clearance 4 ft on each side.
7. ⇨ Direction of airflow.

UNIT SIZE	"B"	"C"	"D" Alt Drain Hole	Power	Control	Connector Package Accessory
558D036-072	21 11/16″ [551]	16″ [406]	1¾″ [44.5]	¾″ NPT	½″ NPT	CRBTMPWR001A00 (THRU-THE-BOTTOM)
				1¼″ NPT	½″ NPT	CRBTMPWR002A00 (THRU-THE-BOTTOM)

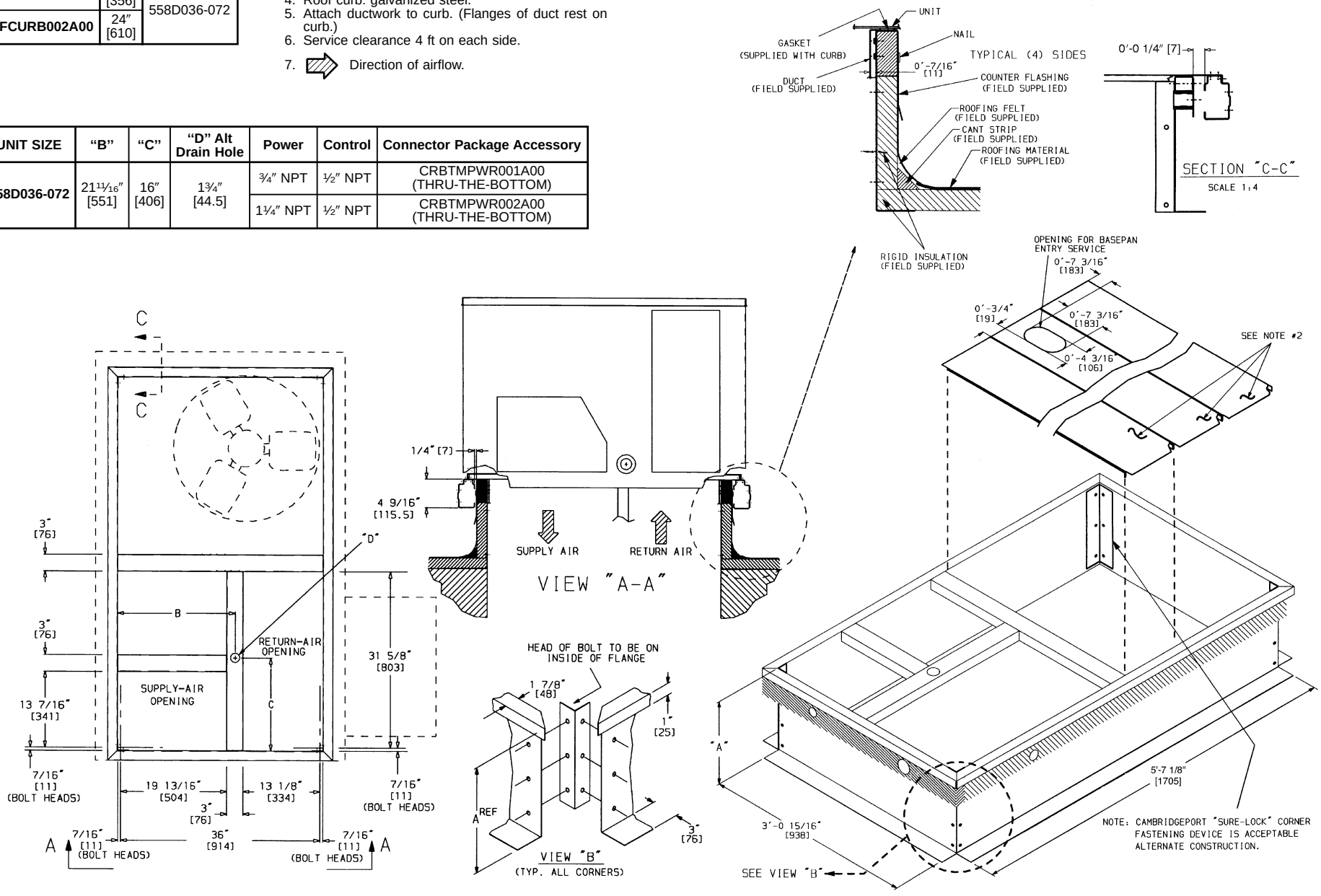


Fig. 4 — Roof Curb

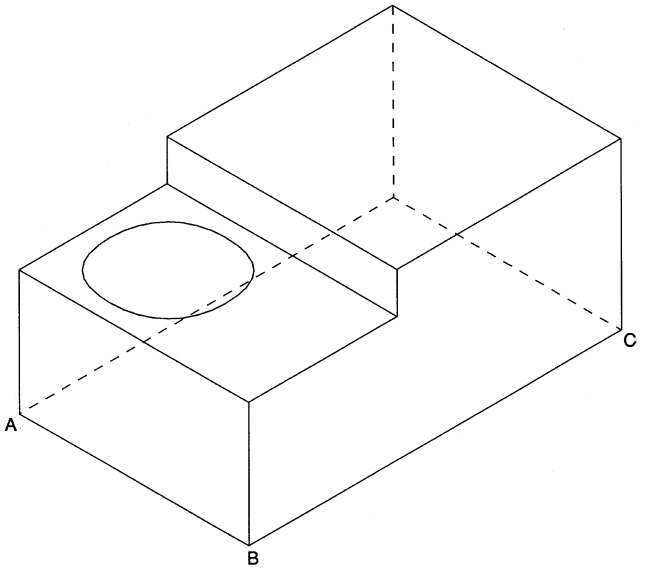
Table 1 — Specifications

BASE UNIT 558D		036	048	060	072
NOMINAL CAPACITY (tons)		3	4	5	6
OPERATING WEIGHT (lb)					
Unit		365	375	395	470
Durablade Economizer		34	34	34	34
PARABLADE Economizer		42	42	42	42
Roof Curb		115	115	115	115
COMPRESSOR TYPE		Reciprocating	Reciprocating	Reciprocating	Scroll
Quantity		1	1	1	1
Oil (oz)		50	50	50	54
REFRIGERANT TYPE		R-22			
Operating Charge (lb-oz)		3-6	5-8	7-0	7-11
CONDENSER COIL		Enhanced Copper Tubes, Aluminum Lanced Fins			
Rows...Fins/in.		1...17	1...17	2...17	2...17
Total Face Area (sq ft)		7.36	13.19	10.42	10.42
CONDENSER FAN		Propeller Type			
Nominal Cfm		3500	4000	4000	4000
Quantity...Diameter (in.)		1...22.0	1...22.0	1...22.0	1...22.0
Motor Hp...Rpm		¼...1100	¼...1100	¼...1100	¼...1100
Watts Input (Total)		325	325	325	325
EVAPORATOR COIL		Enhanced Copper Tubes, Aluminum Double-Wavy Fins			
Rows...Fins/in.		2...15	2...15	3...15	4...15
Total Face Area (sq ft)		4.17	5.5	5.5	5.5
EVAPORATOR FAN		Centrifugal Type			
Quantity...Size (in.)	Std	1...10 x 10	1...10 x 10	1...11 x 10	1...10 x 10
	Alt	1...10 x 10	1...10 x 10	1...10 x 10	—
Type Drive	Std	Direct	Direct	Direct	Belt
	Alt	Belt	Belt	Belt	—
Nominal Cfm	Std	1200	1600	2000	2400
	Alt	1200	1600	2000	—
Maximum Continuous Bhp	Std	.34	.75	1.20	2.40
	Alt	1.00	1.00	1.3/2.4*	—
Motor Frame Size	Std	48	48	48	56
	Alt	48	48	48/56*	—
Nominal Rpm High/Low	Std	860/800	1075/970	1075/970	—
	Alt	—	—	—	—
Fan Rpm Range	Std	—	—	—	1070-1460
	Alt	760-1090	840-1185	900-1300	—
Motor Bearing Type		Ball	Ball	Ball	Ball
Maximum Allowable Rpm		2100	2100	2100	2100
Motor Pulley Pitch Diameter Min/Max (in.)	Std	—	—	—	2.8/3.8
	Alt	1.9/2.9	1.9/2.9	2.4/3.4	—
Nominal Motor Shaft Diameter (in.)	Std	½	½	½	⅝
	Alt	½	½	⅝	—
Fan Pulley Pitch Diameter (in.)	Std	—	—	—	4.5
	Alt	4.5	4.0	4.5	—
Belt, Quantity...Type...Length (in.)	Std	—	—	—	1...A...40
	Alt	1...A...39	1...A...36	1...A...39	—
Pulley Center Line Distance (in.)	Std	—	—	—	14.7-15.5
	Alt	10.0-12.4	10.0-12.4	14.7-15.5	—
Speed Change per Full Turn of	Std	—	—	—	80
Movable Pulley Flange (rpm)	Alt	65	70	80	—
Movable Pulley Maximum Full Turns	Std	—	—	—	5
From Closed Position	Alt	5	5	5	—
Factory Setting	Std	—	—	—	3
	Alt	3	3	3	—
Factory Speed Setting (rpm)	Std	—	—	—	1225
	Alt	890	980	1060	—
Fan Shaft Diameter at Pulley (in.)		⅝	⅝	⅝	⅝
HIGH-PRESSURE SWITCH (psig)†					
Standard Compressor Internal Relief (Differential)			450 ± 50		500 ± 50
Cutout			428		428
Reset (Auto.)			320		320
LOW-PRESSURE/LOSS-OF-CHARGE SWITCH (Liquid Line)(psig)†					
Cutout			7 ± 3		
Reset (Auto.)			22 ± 7		
FREEZE-PROTECTION THERMOSTAT (F)†					
Opens			30 ± 5		
Closes			45 ± 5		
OUTDOOR-AIR INLET SCREENS		Cleanable			
Quantity...Size (in.)		1...20 x 24 x 1			
RETURN-AIR FILTERS		Throwaway			
Quantity...Size (in.)		2...16 x 25 x 2			

LEGEND

Bhp — Brake Horsepower

*Single phase units — 1.3 bhp/48 frame.
Three phase units — 2.4 bhp/56 frame.
†Requires an optional or accessory controls upgrade kit.



MAXIMUM ALLOWABLE DIFFERENCE (in.)

A-B	B-C	A-C
0.5	1.0	1.0

Fig. 5 — Unit Leveling Tolerances

IV. FIELD CONNECTIONS

A. External Trap Condensate Drain

The unit's ¾-in. condensate drain connections are located on the bottom and side of the unit. Unit discharge connections do not determine the use of drain connections; either drain connection can be used with vertical or horizontal applications.

When using the standard side drain connection, make sure the plug in the alternate bottom connection is tight before installing the unit.

To use the bottom drain connection for a roof curb installation, relocate the factory-installed plug from the bottom connection to the side connection. See Fig. 7. The piping for the condensate drain and external trap can be completed after the unit is in place.

All units must have an external trap for condensate drainage. Install a trap at least 4-in. deep and protect against freeze-up. See Fig. 8. If drain line is installed downstream from the external trap, pitch the line away from the unit at 1 in. per 10 ft of run. Do not use a pipe size smaller than the unit connection.

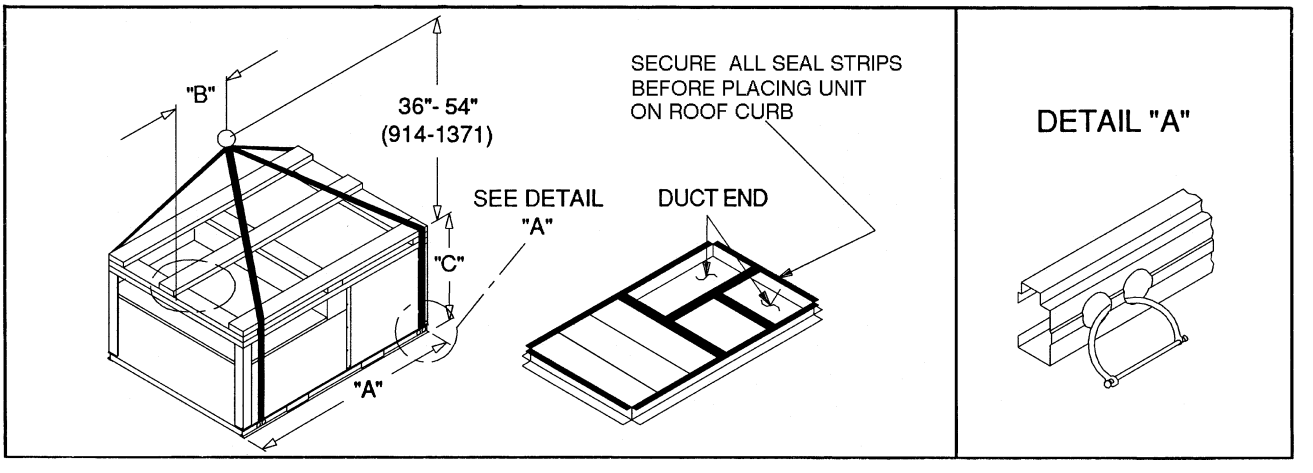
B. Field Duct Connections

NOTE: The design and installation of the duct system must be in accordance with NFPA standards for the installation of nonresidence-type air conditioning and ventilating systems, NFPA No. 90A or residence-type, NFPA No. 90B, and/or local codes and ordinances.

Adhere to the following criteria when selecting, sizing and installing the duct system:

1. Remove appropriate panels from unit to obtain either horizontal or vertical discharge. If units are installed in horizontal discharge applications, remove vertical discharge duct covers, save screws and install covers over vertical duct openings.
2. Select and size ductwork, supply-air registers and return-air grilles according to ASHRAE (American Society of Heating, Refrigeration and Air-Conditioning Engineers) recommendations.

⚠**CAUTION:** When drilling the duct system fastening holes into the side of the unit for duct flanges, be careful not to puncture the coil or coil tubes. See Fig. 9.



UNIT	MAX WEIGHT		"A"		"B"		"C"	
	Lb	Kg	in.	mm	in.	mm	in.	mm
558D036	415	188	73.69	1872	35.00	889	33.35	847
558D048	425	193						
558D060	445	202						
558D072	520	236						

NOTES:
1. Dimension in ( ) is in millimeters.
2. Hook rigging shackles through holes in base rail, as shown in detail "A." Holes in base rails are centered around the unit center of gravity. Use wooden top skid when rigging to prevent rigging straps from damaging unit.
3. Weights do not include economizer. See Table 1 for economizer weights.

⚠**CAUTION:** All panels must be in place when rigging.

Fig. 6 — Rigging Details

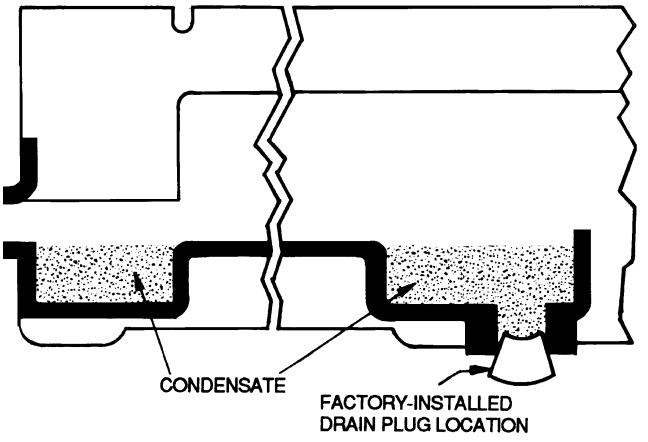
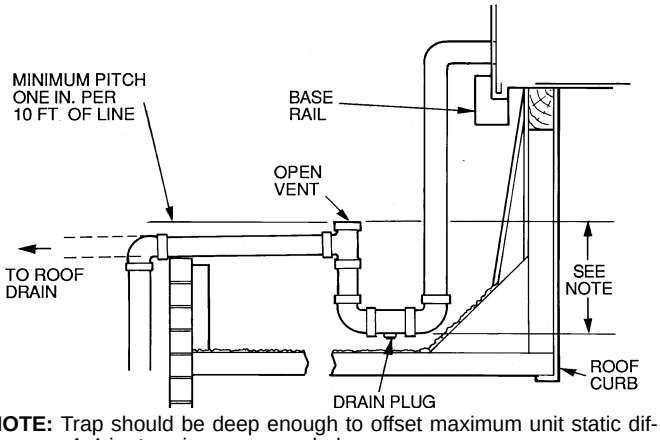


Fig. 7 — Internal Trap Condensate Drain



NOTE: Trap should be deep enough to offset maximum unit static difference. A 4-in. trap is recommended.

Fig. 8 — External Trap Condensate Drain

3. Use flexible transition between rigid ductwork and unit to prevent transmission of vibration. The transition may be screwed or bolted to duct flanges. Use suitable gaskets to ensure weather- and airtight seal.
4. When horizontal return is used, install external field-supplied air filter(s) in return-air ductwork where it is easily accessible for service. Recommended filter sizes are shown in Table 1.
5. Size all ductwork for maximum required airflow (either heating or cooling) for unit being installed. Avoid abrupt duct size increases or decreases.
6. Adequately insulate and weatherproof all ductwork located outdoors. Insulate ducts passing through unconditioned space, and use vapor barrier in accordance with latest issue of SMACNA (Sheet Metal and Air Conditioning Contractors National Association) and ACCA (Air Conditioning Contractors National Association) minimum installation standards for heating and air conditioning systems. Secure all ducts to building structure.

   A minimum clearance to combustibles is not required around ductwork on vertical discharge units. On horizontal discharge units, a minimum clearance of one in. is required for the first 12 in. of ductwork.
7. Flash, weatherproof and vibration-isolate all openings in building structure in accordance with local codes and good building practices.

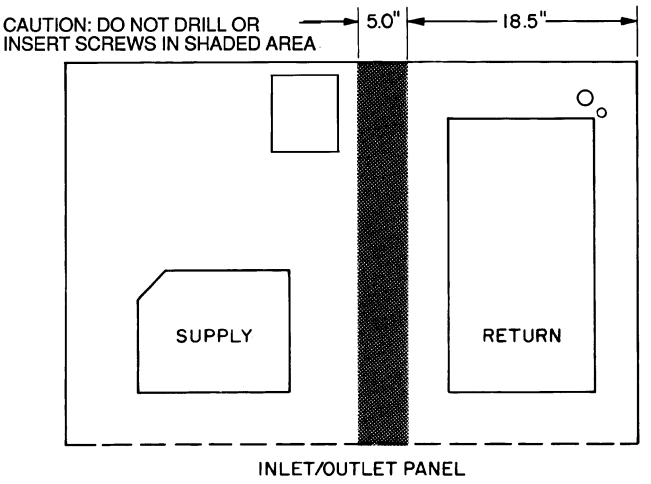


Fig. 9 — Location of Coil Area Not to be Drilled

C. Electrical Connections

⚠ **WARNING:** The unit cabinet must have an uninterrupted, unbroken, electrical ground to minimize the possibility of personal injury if an electrical fault should occur. This ground may consist of electrical wire connected to the unit ground lug in the control compartment or conduit approved for electrical ground when installed in accordance with NEC ANSI (American National Standards Institute)/NFPA, latest edition, (in Canada, Canadian Electrical Code CSA [Canadian Standards Association] C22.1); and local electrical codes. Failure to adhere to this warning could result in personal injury.

⚠ **CAUTION:** Failure to obey the following precautions could result in damage to the unit being installed:

Field Power Supply (Fig. 10 and 11)

1. Make all electrical connections in accordance with NEC ANSI/NFPA, latest edition, and local electrical codes governing such wiring. In Canada, all electrical connections must be in accordance with CSA Standard C22.1 Canadian Electrical Code Part 1 and applicable local codes. Refer to unit wiring diagram.
2. A unit disconnect switch is required within sight from the unit. The disconnect switch may be mounted on the unit corner post. When mounting disconnect switch, be sure the unit rating plate is not obstructed.
3. Use only *copper* conductor for connections between field-supplied electrical disconnect switch and unit. The use of aluminum wire is not recommended. Maximum wire size is number 2 AWG (American Wire Gage) on units without heat. The maximum wire size is number 2/0 AWG on units with heat.
4. Insulate low-voltage wires for highest voltage contained within conduit when low-voltage control wires are run in same conduit as high-voltage wires.
5. Do not damage internal components when drilling through any panel to mount electrical hardware, conduit, etc.

High-Voltage Connections (Fig. 10)

The unit must have a separate electrical service with a field-supplied, waterproof, fused, disconnect switch mounted at, or within sight of, the unit. Refer to the unit rating plate for maximum fuse/circuit breaker size and minimum circuit amps (ampacity) for wire sizing. Be sure disconnect switch does not obstruct unit rating plate.

The field-supplied disconnect switch box may be mounted on the unit's end panel or on the corner post. Mount disconnect box on the left side of the rating plate when mounting on the unit's end panel. Do not mount the disconnect box over the unit rating plate. When mounting disconnect box on corner post, secure disconnect box to corner post and condenser coil top cover. See Fig. 12.

A disconnect box mounting space is available when an optional or accessory condenser coil grille is used. Mount the disconnect on the sheet metal provided with the condenser coil grille. The sheet metal is located adjacent to the corner post on the left side of the power wiring access panel.

Install field wiring as follows:

1. Connect ground lead to chassis ground connection when using separate ground wire.
2. Install conduit between disconnect and power wiring access panel. Insert conduit through power supply knockout opening. See Fig. 12.
3. Install power lines to power wiring leads.
4. Pigtails are provided for field power connections and are located inside the power wiring access panel. See Fig. 11. Use factory-supplied splices or Underwriters' Laboratories (UL) approved copper connector.

Voltage to compressor terminals during operation must be within voltage range indicated on unit nameplate (see Table 2). On 3-phase units, voltages between phases must be balanced within 2% and the current within 10%. Use the formula shown in the legend for Table 2, Note 2 to determine the percent of voltage imbalance. Operation on improper line voltage or excessive phase imbalance constitutes abuse and may cause damage to electrical components. Such operation would invalidate any applicable warranty.

Special Procedures for 208-V Operation

⚠ DANGER: Make sure that the power supply to the unit is switched OFF before making any wiring changes. Electrical shock can cause personal injury or death.

For operation on 208 v, disconnect the transformer primary orange lead from the contactor. See the unit wiring label. Remove the tape and cover from the terminal on the end of the transformer primary red lead. Save the cover. Connect the red lead to the contactor terminal from which the orange lead was disconnected.

Using the cover removed from the red lead, insulate the loose terminal on the orange lead. Wrap the cover with electrical tape so that the metal terminal cannot be seen.

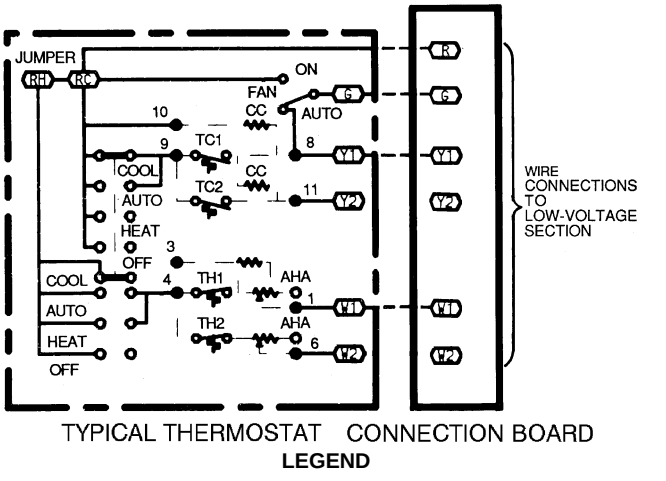
Control Voltage Connection

Install a factory-approved room thermostat. Locate the thermostat on an inside wall in the space to be conditioned where it will not be subjected to either a cooling or heating source or direct exposure to sunlight. Mount the thermostat 4 to 5 ft above the floor. See accessory installation instructions.

NOTE: For wire runs up to 50 ft, use number 18 AWG insulated wire (35 C minimum). For 51 to 75 ft, use number 16 AWG insulated wire (35 C minimum). For 76 to 150 ft, use number 14 AWG insulated wire (35 C minimum). All wire larger than number 18 AWG cannot be connected directly to the thermostat and will require a junction box and splice at the thermostat.

Feed control wires through the raceway located between the condenser coil top cover and power wiring access panel. See Fig. 12. Connect control wires to the low-voltage connections located inside low-voltage access panel. See Fig. 10, 11, and 13 for connections. The barrier provides the UL required clearance between high- and low-voltage wiring.

NOTE: If thru-the-bottom power connections are used refer to the accessory installation instructions for information on power wiring. Refer to Fig. 2 for drilling holes in basepan.



LEGEND

AHA — Adjustable Heat Anticipator
CC — Cooling Compensator
TC — Thermostat-Cooling
TH — Thermostat-Heating
Field Wiring
Factory Wiring

NOTES:
1. The Y2 wiring is connected when an economizer is used.
2. Connect W1 when unit is equipped with an accessory 1-module heater package. The W2 wiring is connected when unit is equipped with an accessory 2-module heater package.

Fig. 11 — Low-Voltage Connections

LEGEND

C — Contactor
CAP — Capacitor
GND — Ground
IFC — Indoor (Evaporator) Fan Contactor
IFR — Indoor (Evaporator) Fan Relay
NEC — National Electrical Code
OFC — Outdoor (Condenser) Fan Contactor
TB — Terminal Block
TDR — Time-Delay Relay
TRAN — Transformer

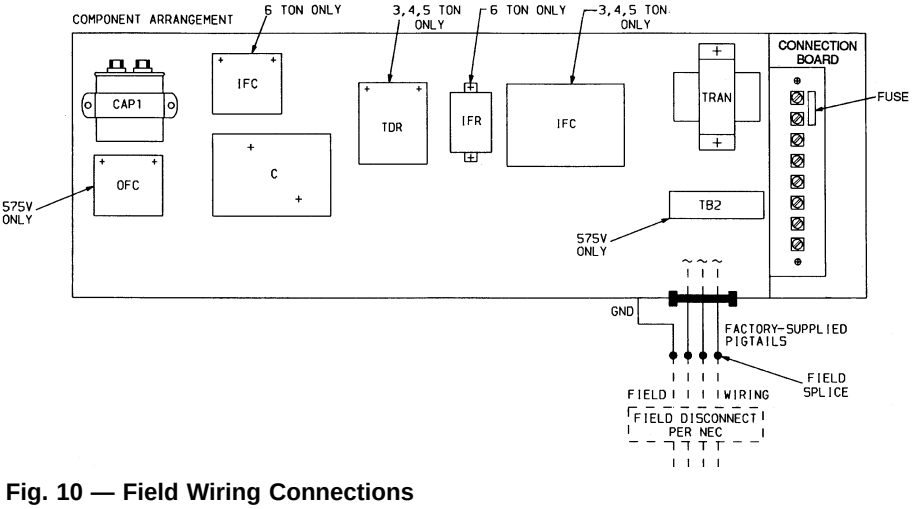
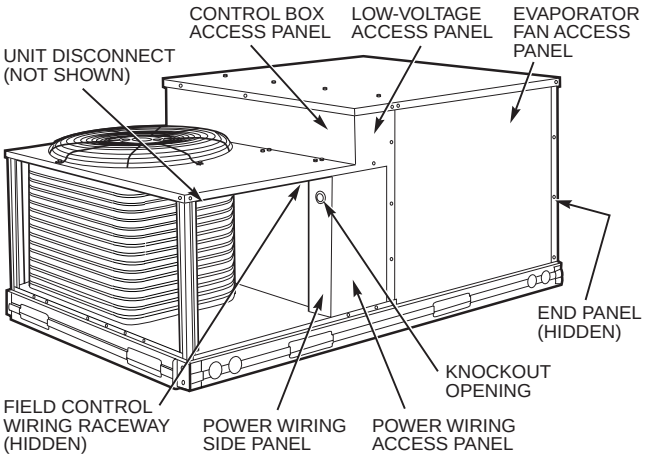
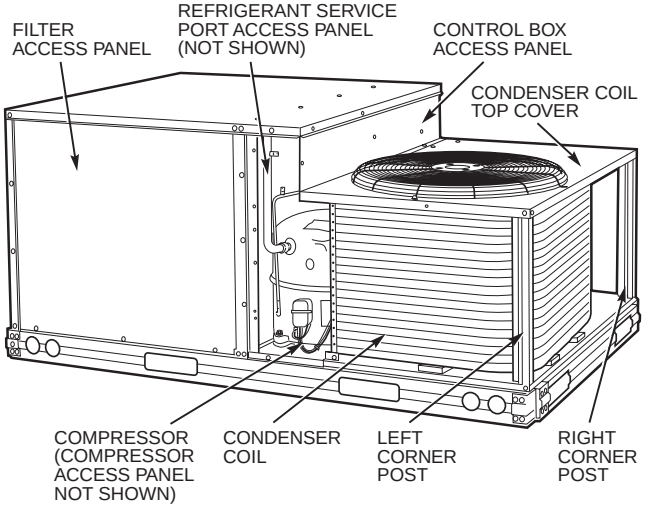


Fig. 10 — Field Wiring Connections




FILTER ACCESS PANEL
REFRIGERANT SERVICE PORT ACCESS PANEL (NOT SHOWN)
CONTROL BOX ACCESS PANEL
CONDENSER COIL TOP COVER
COMPRESSOR (COMPRESSOR ACCESS PANEL NOT SHOWN)
CONDENSER COIL
LEFT CORNER POST
RIGHT CORNER POST

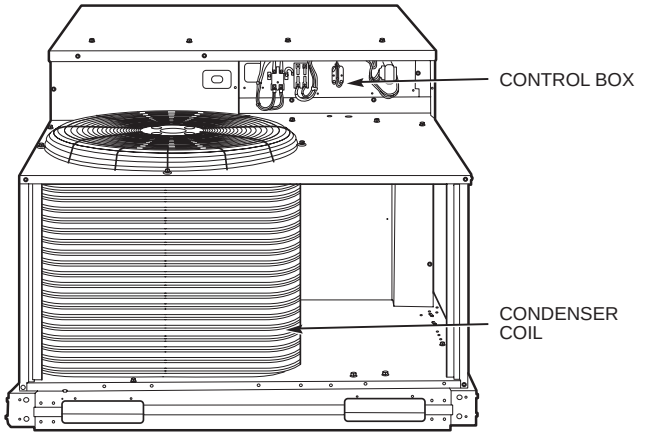


Fig. 12 — Typical Component Location

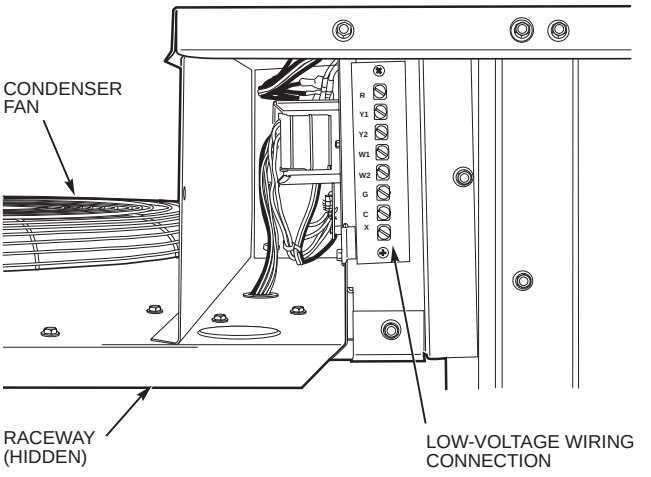


Fig. 13 — Low-Voltage Location

Transformer Circuit Breaker (Fig. 14)

The unit transformer contains an automatic-reset overcurrent protector for control circuit protection. If this device trips, it may reset without warning and start the heating or cooling section of this product. Use caution when servicing: If overcurrent protector continues to trip, there is a problem in the low-voltage electrical circuit (i.e., electrical short, ground or transformer overload). Disconnect power, correct the condition, and check for normal unit operation.

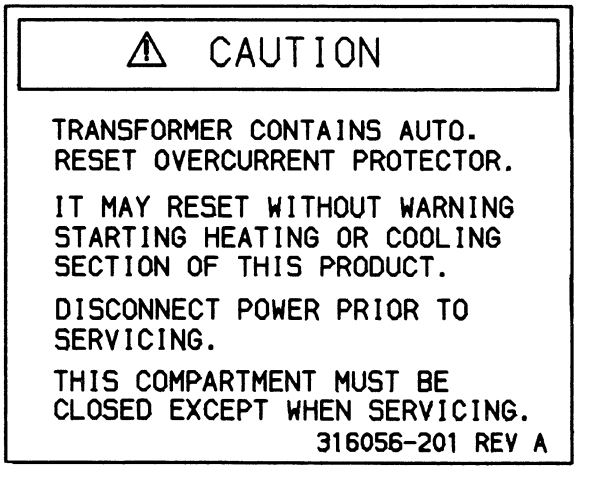

⚠ CAUTION
TRANSFORMER CONTAINS AUTO. RESET OVERCURRENT PROTECTOR.
IT MAY RESET WITHOUT WARNING STARTING HEATING OR COOLING SECTION OF THIS PRODUCT.
DISCONNECT POWER PRIOR TO SERVICING.
THIS COMPARTMENT MUST BE CLOSED EXCEPT WHEN SERVICING.
316056-201 REV A

Fig. 14 — Transformer Label

Table 2 — Electrical Data

UNIT 558D	NOMINAL V-PH-Hz	IFM TYPE	VOLTAGE RANGE		COMPR (each)		OFM	IFM	ELECTRIC HEAT*		POWER SUPPLY		DISCONNECT SIZE**	
			Min	Max	RLA	LRA	FLA	FLA	Nominal kW	FLA	MCA	MOCP†	FLA	LRA
036 (3 Ton)	208/230-1-60	Std	187	254	16.9	86.7	1.4	2.8	— 3.3/ 4.4 4.9/ 6.5 6.5/ 8.7 7.9/10.5 9.8/13.0	— 15.9/18.3 23.8/27.3 31.4/36.2 37.9/43.8 47.1/54.6	25.3/ 25.3 25.3/ 26.4 32.8/ 37.4 42.8/ 48.8 50.9/ 58.2 62.2/ 71.2	35/ 35 35/ 35 35/ 40 45/ 50 60/ 60 70/ 80††	24/ 24 24/ 24 30/ 34 39/ 45 47/ 54 57/ 66	97/ 97 97/ 97 97/ 97 97/ 97 97/ 97 97/ 97
		Alt						4.9	— 3.3/ 4.4 4.9/ 6.5 6.5/ 8.7 7.9/10.5 9.8/13.0	— 15.9/18.3 23.5/27.1 31.4/36.3 37.9/43.8 46.9/54.2	27.4/ 27.4 27.4/ 29.0 35.5/ 40.0 45.4/ 51.4 53.5/ 60.8 64.8/ 73.8	35/ 35 35/ 35 35/ 40 45/ 60 60/ 60 70/ 80††	27/ 27 27/ 27 33/ 37 42/ 47 49/ 56 60/ 68	102/102 102/102 102/102 102/102 102/102 102/102
	208/230-3-60	Std	187	254	11.7	65.1	1.4	2.8	— 3.3/ 4.4 4.9/ 6.5 6.5/ 8.7 7.9/10.5 12.0/16.0	— 9.2/10.6 13.6/15.6 18.1/20.9 21.9/25.3 33.5/38.6	18.8/ 18.8 18.8/ 18.8 20.4/ 23.0 26.2/ 29.7 30.9/ 35.1 45.3/ 51.7	25/ 25 25/ 25 25/ 25 30/ 30 35/ 40 50/ 60	18/ 18 18/ 18 19/ 21 24/ 27 28/ 32 42/ 48	76/ 76 76/ 76 76/ 76 76/ 76 76/ 76 76/ 76
		Alt						4.9	— 3.3/ 4.4 4.9/ 6.5 6.5/ 8.7 7.9/10.5 12.1/16.0	— 9.2/10.6 13.6/15.6 18.1/20.9 21.9/25.3 33.5/38.6	20.9/ 20.9 20.9/ 20.9 23.1/ 25.7 28.8/ 32.3 33.5/ 37.7 47.9/ 54.4	25/ 25 25/ 25 25/ 25 30/ 35 35/ 40 50/ 60	21/ 21 21/ 21 21/ 24 26/ 30 31/ 35 44/ 50	80/ 80 80/ 80 80/ 80 80/ 80 80/ 80 80/ 80
	460-3-60	Std	414	508	5.1	32.8	0.8	1.3	— 6.0 8.8 11.5 14.0	— 7.2 10.6 13.8 16.8	8.5 10.6 14.9 18.9 22.7	15 15 15 20 25	8 10 14 17 21	38 38 38 38 38
		Alt						2.1	— 6.0 8.8 11.5 14.0	— 7.2 10.6 13.8 16.8	9.3 11.6 15.9 19.9 23.7	15 15 20 20 25	9 10 15 18 22	41 41 41 41 41
	575-3-60	Std	518	632	4.1	27.0	0.8‖	1.3‖	—	—	6.8	15	7	31
		Alt						2.1‖	—	—	7.4	15	7	34
048 (4 Ton)	208/230-1-60	Std	187	254	23.3	118.0	1.4	3.5	— 3.3/ 4.4 6.5/ 8.7 9.8/13.0 13.1/17.4 15.8/21.0	— 15.9/18.3 31.4/36.3 46.9/54.2 62.8/72.5 75.8/87.5	34.0/ 34.0 34.0/ 34.0 43.6/ 49.7 63.0/ 72.1 82.9/ 95.0 99.2/113.8	40/ 40 40/ 40 45/ 50 70/ 80†† 90/100†† 100/125††	32/ 32 32/ 32 40/ 46 58/ 66 76/ 87 91/105	128/128 128/128 128/128 128/128 128/128 128/128
		Alt						4.9	— 3.3/ 4.4 6.5/ 8.7 9.8/13.0 13.1/17.4 15.8/21.0	— 15.9/18.3 31.4/36.3 46.9/54.2 62.8/72.5 75.8/87.5	35.4/ 35.4 35.4/ 35.4 45.4/ 51.4 64.8/ 73.8 84.7/ 96.8 100.9/115.5	40/ 40 40/ 40 45/ 60 70/ 80†† 90/100†† 100/125††	34/ 34 34/ 34 42/ 47 60/ 68 78/ 89 93/106	129/129 129/129 129/129 129/129 129/129 129/129
	208/230-3-60	Std	187	254	15.4	90.0	1.4	3.5	— 4.9/ 6.5 6.5/ 8.7 12.0/16.0 15.8/21.0	— 13.6/15.6 18.1/20.9 33.4/38.5 43.8/50.5	24.2/ 24.2 24.2/ 24.2 27.0/ 30.5 46.1/ 52.5 59.1/ 67.5	30/ 30 30/ 30 30/ 35 50/ 60 60/ 70††	24/ 24 24/ 25 27/ 30 45/ 51 58/ 64	100/100 100/100 100/100 100/100 100/100
		Alt						4.9	— 4.9/ 6.5 6.5/ 8.7 12.0/16.0 15.8/21.0	— 13.6/15.6 18.1/20.9 33.4/38.5 43.8/50.5	25.6/ 25.6 25.6/ 25.7 28.8/ 32.3 47.8/ 54.2 60.8/ 69.3	30/ 30 30/ 30 30/ 35 50/ 60 60/ 70††	24/ 24 24/ 24 25/ 29 43/ 49 55/ 63	101/101 101/101 101/101 101/101 101/101
	460-3-60	Std	414	508	8.3	45.0	0.8	1.8	— 6.0 11.5 14.0 23.0	— 7.2 13.8 16.6 27.7	13.0 13.0 19.5 23.0 36.8	15 15 20 25 40	13 13 18 21 34	51 51 51 51 51
		Alt						2.1	— 6.0 11.5 14.0 23.0	— 7.2 14.0 16.6 27.7	13.3 13.3 19.9 23.4 37.2	15 15 20 25 40	13 13 18 22 34	52 52 52 52 52
	575-3-60	Std	518	632	6.4	36.0	0.8‖	1.8‖	—	—	10.6	15	10	42
		Alt						2.1‖	—	—	10.9	15	11	43

Table 2 — Electrical Data (Cont)

UNIT 558D	NOMINAL V-PH-Hz	IFM TYPE	VOLTAGE RANGE		COMPR (each)		OFM	IFM	ELECTRIC HEAT*		POWER SUPPLY		DISCONNECT SIZE**	
			Min	Max	RLA	LRA	FLA	FLA	Nominal kW	FLA	MCA	MOCP†	FLA	LRA
060 (5 Ton)	208/230-1-60	Std	187	254	28.8	147	1.4	5.9	— 4.9/ 6.5 6.5/ 8.7 9.8/13.0 13.0/17.4 15.8/21.0	— 23.5/27.1 31.4/36.3 46.9/54.2 62.8/72.5 75.8/87.5	43.3/ 43.3 43.3/ 43.3 46.6/ 52.7 66.0/ 75.1 85.9/ 98.0 102.2/116.8	60/ 60 60/ 60 60/ 60 70/ 80†† 90/100†† 110/125††	42/ 42 42/ 42 43/ 49 61/ 69 79/ 90 94/107	159/159 159/159 159/159 159/159 159/159 159/159
		Alt						8.8	— 4.9/ 6.5 6.5/ 8.7 9.8/13.0 13.0/17.4 15.8/21.0	— 23.5/27.1 31.4/36.3 46.9/54.2 62.8/72.5 75.8/87.5	46.2/ 46.2 46.2/ 46.2 49.9/ 55.9 69.3/ 78.3 89.2/101.3 105.5/120.0	60/ 60 60/ 60 60/ 60 70/ 80†† 90/110†† 110/125††	45/ 45 45/ 45 46/ 52 64/ 72 82/ 93 97/110	162/162 162/162 162/162 162/162 162/162 162/162
	208/230-3-60	Std	187	254	16.3	114	1.4	5.9	— 4.9/ 6.5 7.9/10.5 12.0/16.0 15.8/21.0 19.9/26.5	— 13.6/15.6 21.9/25.3 33.4/38.5 43.8/50.5 55.2/63.8	27.7/ 27.7 27.7/ 27.7 34.7/ 38.9 49.1/ 55.5 62.1/ 70.5 76.4/ 87.1	35/ 35 35/ 35 40/ 40 50/ 60 70/ 80†† 80/ 90††	27/ 27 27/ 27 32/ 36 46/ 51 57/ 65 70/ 80	126/126 126/126 126/126 126/126 126/126 126/126
		Alt						5.8	— 4.9/ 6.5 7.9/10.5 12.0/16.0 15.8/21.0 19.9/26.5	— 13.6/15.6 21.9/25.3 33.4/38.5 43.8/50.5 55.2/63.8	26.8/ 26.8 26.8/ 26.8 35.3/ 39.5 49.6/ 56.0 62.6/ 71.1 77.0/ 87.6	40/ 40 40/ 40 45/ 45 60/ 60 70/ 80†† 80/100††	27/ 27 27/ 27 32/ 36 45/ 51 57/ 65 70/ 80	125/125 125/125 125/125 125/125 125/125 125/125
	460-3-60	Std	414	508	7.4	64	0.8	3.2	— 6.0 11.5 14.0 23.0 25.5	— 7.2 13.8 16.8 27.7 30.1	13.3 13.3 21.3 25.0 38.6 41.6	20 20 25 30 40 45	13 13 20 23 36 38	69 69 69 69 69 69
		Alt						2.6	— 6.0 11.5 14.0 23.0 25.0	— 7.2 13.8 16.8 27.7 30.1	12.7 12.7 21.0 24.8 38.3 41.3	20 20 25 30 45 45	12 12 19 22 35 38	70 70 70 70 70 70
	575-3-60	Std	518	632	6.2	52	0.8‖	3.2‖	—	—	11.8	15	12	57
		Alt						2.6‖	—	—	11.2	15	12	59
072 (6 Ton)	208/230-3-60	Std	187	254	23.6	146.0	1.4	5.2	— 4.9/ 6.5 7.9/10.5 12.0/16.0 15.8/21.0 19.9/26.5	— 13.6/15.6 21.9/25.3 33.4/38.4 43.8/50.5 55.2/63.8	36.1/ 36.1 36.1/ 36.1 36.1/ 38.1 48.2/ 54.6 61.2/ 69.6 75.6/ 86.2	45/ 45 45/ 45 45/ 45 50/ 60 70/ 70†† 80/ 90††	35/ 35 35/ 35 35/ 35 44/ 50 56/ 64 70/ 79	191/191 191/191 191/191 191/191 191/191 191/191
	460-3-60	Std	414	508	10.6	73.0	0.8	2.6	— 6.0 11.5 14.0 23.0 25.5	— 7.2 13.8 16.8 27.8 30.7	16.7 16.7 20.5 24.3 37.8 41.6	20 20 25 25 40 45	16 16 19 22 35 38	90 90 90 90 90 90
	575-3-60	Std	518	632	8.5	58.4	0.8‖	2.6‖	—	—	13.3	20	14	75

IMPORTANT: Optional, alternate evaporator-fan motor and drive are not available for 558D072 units. Contact your local representative for more information about field-installed motors.

LEGEND

COMPR — Compressor
FLA — Full Load Amps
HACR — Heating, Air Conditioning and Refrigeration
IFM — Indoor (Evaporator) Fan Motor
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps
MOCP — Maximum Overcurrent Protection
NEC — National Electrical Code
OFM — Outdoor (Condenser) Fan Motor
RLA — Rated Load Amps

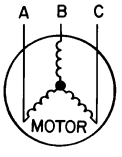
*Available for field-installed accessory heaters only. Heater capacity (kW) is based on heater voltage of 208 v, 240 v or 480 v. If power distribution voltage to unit varies from rated heater voltage, heater kW will vary accordingly.
†Fuse or HACR circuit breaker.
**Used to determine minimum disconnect per NEC.
††Fusing single-point box provides the required branch circuit protection.
‖Ampacities are based on 460 v. MCA and MOCP are based on 575 v.

NOTES:
1. In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker.
2. **Unbalanced 3-Phase Supply Voltage**
   Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percent of voltage imbalance.

% Voltage Imbalance

$$= 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

Example: Supply voltage is 460-3-60.



AB = 452 v
BC = 464 v
AC = 455 v

$$\text{Average Voltage} = \frac{452 + 464 + 455}{3}$$

$$= \frac{1371}{3}$$

$$= 457$$

NOTE: The 575-v units are Canada only.
Determine maximum deviation from average voltage.
(AB) 457 - 452 = 5 v
(BC) 464 - 457 = 7 v
(AC) 457 - 455 = 2 v

Maximum deviation is 7 v.

Determine percent voltage imbalance.

$$\% \text{ Voltage Imbalance} = 100 \times \frac{7}{457}$$

$$= 1.53\%$$

This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately.

D. Accessory Installation

At this time, any required accessories should be installed on the unit. Control wiring information is provided in the unit wiring diagram. Refer to Accessory Installation Instructions provided with accessory.

E. Optional Outdoor-Air Damper Installation

The outdoor-air hood and screen are attached to the basepan at the bottom of the unit for shipping.

Assembly:

1. Determine quantity of ventilation required for building. Record amount for use in Step 8.
2. Remove filter access panel by raising panel and swinging panel outward. Panel is now disengaged from track and can be removed. No tools are required to remove filter access panel. Remove and save outdoor-air opening panel and screws. See Fig. 15.
3. Separate hood and screen from basepan by removing the 4 screws and brackets securing them. Save all screws and discard brackets.
4. Replace outdoor-air opening panel.
5. Place hood on front of outdoor air opening panel. See Fig. 16 for hood details. Secure top of hood with the 4 screws removed in Step 3. See Fig. 17.
6. Remove and save 6 screws (3 on each side) from sides of the manual outdoor-air damper assembly.
7. Align screw holes on hood with screw holes on side of manual outdoor-air damper assembly. See Fig. 16 and 17. Secure hood with 6 screws from Step 6.
8. For proper quantity of ventilation air, adjust minimum position setting of the damper blade by adjusting the manual outdoor-air adjustment screws on the front of the damper blade. See Fig. 15. Slide blade vertically until it is in the appropriate position determined by Fig. 18. Tighten screws.
9. Remove and save 4 screws currently on sides of hood. Insert screen. Secure screen to hood using the 4 screws. See Fig. 17.

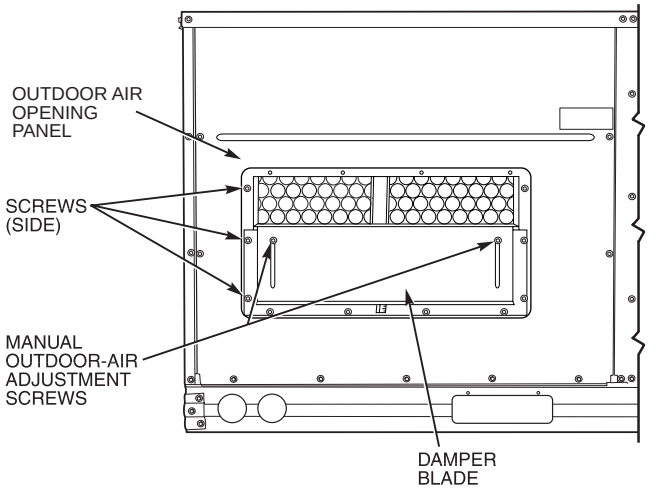


Fig. 15 — Damper Panel With Outdoor-Air Damper Installed

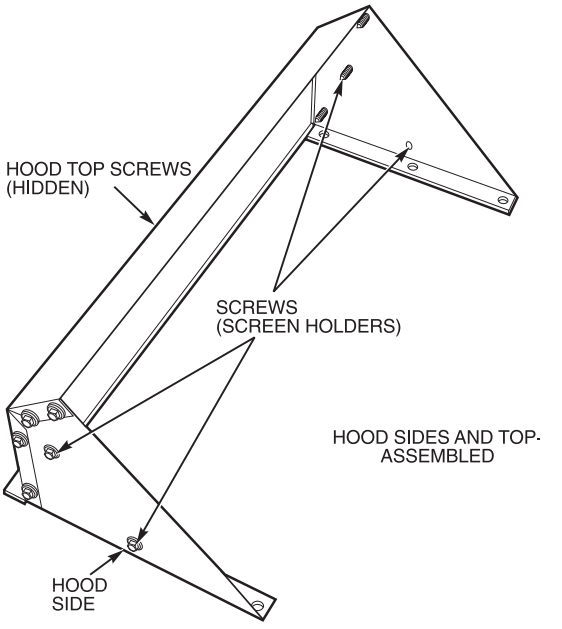


Fig. 16 — Outdoor-Air Hood Details

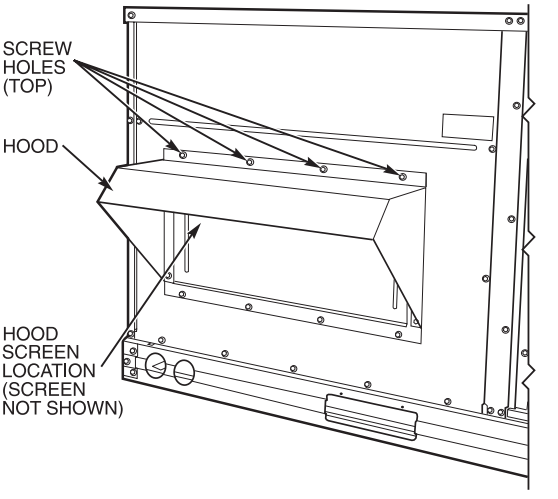


Fig. 17 — Manual Outdoor-Air Damper With Hood Attached

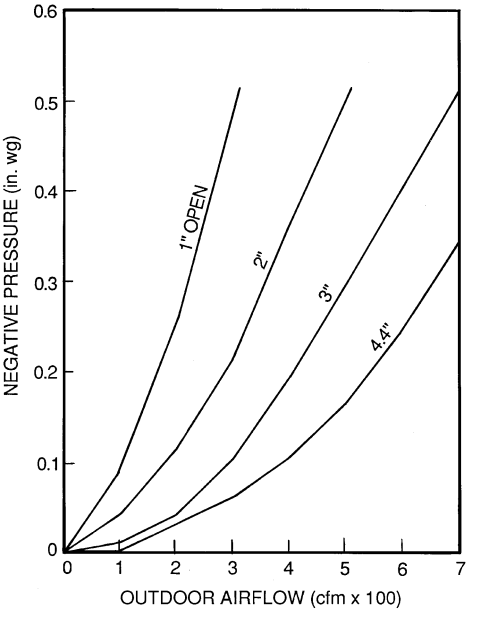


Fig. 18 — Position Setting

F. Optional Durablade Economizer

The optional economizer hood assembly is packaged and shipped in the filter section. Damper blades and control boards are installed at the factory and the economizer is shipped in the vertical position.

NOTE: Horizontal discharge block-off plate is shipped with the air hood package. If unit is to be used for vertical discharge application, discard this plate.

Assembly:

1. Determine if ventilation air is required for building. If so, determine the minimum amount to be supplied by each unit and record quantity of ventilation air needed for use in Step 6.
2. Remove filter access panel by raising panel and s winging panel outward. Panel is now disengaged from track and can be removed. No tools are required to remove filter access panel. Remove outdoor-air opening panel. Save panels and screws. See Fig. 19. Remove optional outdoor-air damper hood package from filter section.
3. Assemble outdoor-air hood top and side plates as shown in Fig. 20. Install seal strips on hood top and sides. Put aside screen retainer and retainer screw for later assembly. *Do not attach hood to unit at this time.*
4. To convert to horizontal discharge application:
   a. Rotate the economizer 90 degrees until the economizer motor faces the condenser section (see Fig. 21).
   b. Rotate barometric relief damper hinge 90 degrees. Barometric relief damper should open vertically to operate properly.
   c. Install horizontal discharge block-off plate over the opening on the access panel. (Block-off plate MUST be installed before installing hood assembly.) See Fig. 22.
5. Insert economizer plug into economizer harness. Remove tape from barometric relief damper. See Fig. 23.
6. If ventilation air is not required, proceed to Step 7. If ventilation air is required, determine the minimum position setting for required airflow. See Fig. 24. Adjust minimum position setting by adjusting the screws on the position setting bracket. Slide bracket until the top screw is in the position determined by Fig. 24. Tighten screws.
7. Remove tape from outdoor-air thermostat (OAT). Fasten OAT to inside of hood using screws and speed clips provided (see Fig. 25). Make sure OAT terminals are positioned up.
8. Replace outdoor-air opening panel using screws from Step 2. Replace filter access panel. Ensure the filter access panel slides along the tracks and is securely engaged.
9. Fasten hood top and side plate assembly (Fig. 20) to outdoor-air opening panel with screws provided.
10. Place knob, supplied with economizer, on OAT. See Fig. 25. Set for 3° F below indoor room thermostat setting. If accessory enthalpy control (EC) is used in place of OAT, see instructions shipped with EC for installation and adjustment (see Fig. 25).
11. Connect OAT per Fig. 26.

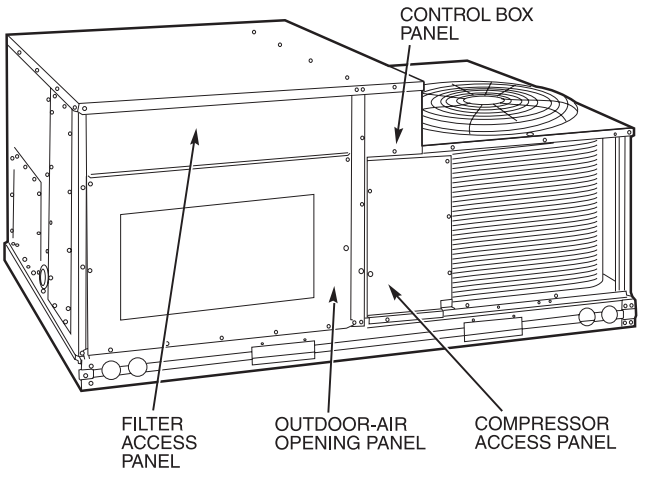
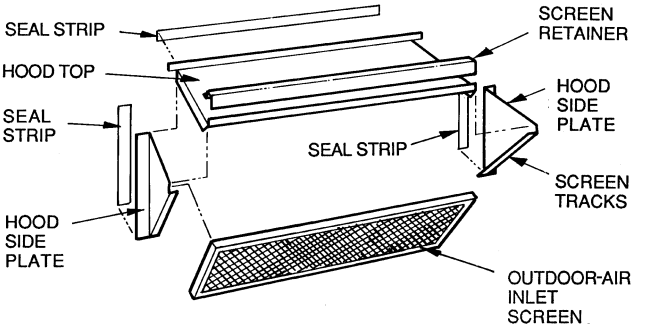


Fig. 19 — Typical Access Panel Locations



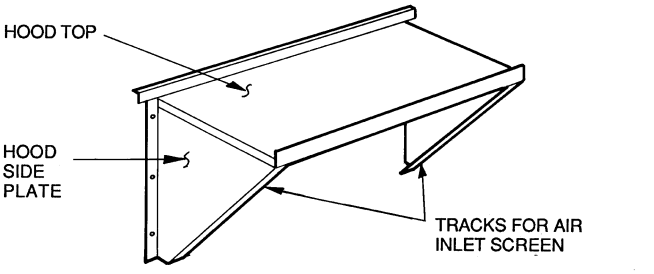


Fig. 20 — Outdoor-Air Hood Details

12. Slide outdoor-air inlet screen into screen track on hood side plate. While holding screen in place, fasten screen retainer to hood using screws provided.

NOTE: Refer to Fig. 27 for economizer barometric relief damper characteristics.

G. Optional PARABLADE Economizer

The optional PARABLADE economizer hood assembly is packaged and shipped in the filter section. Damper blades and control boards are installed at the factory and the economizer is shipped in the vertical discharge position.

NOTE: Horizontal discharge block-off plate is shipped with the air hood package. The PARABLADE economizer can only be used for vertical discharge applications. Discard this plate.

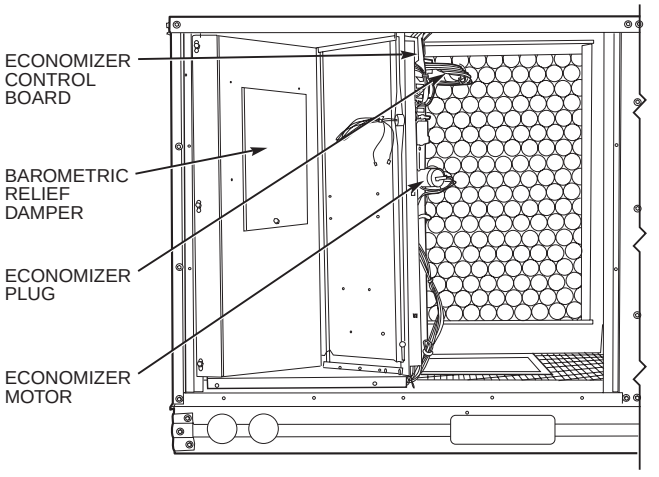


Fig. 21 — Horizontal Durablade Economizer Installation (90 Degree Rotation)

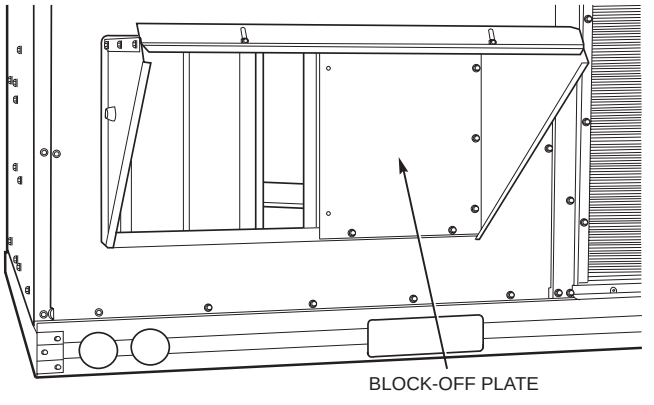


Fig. 22 — Horizontal Discharge Block-Off Plate

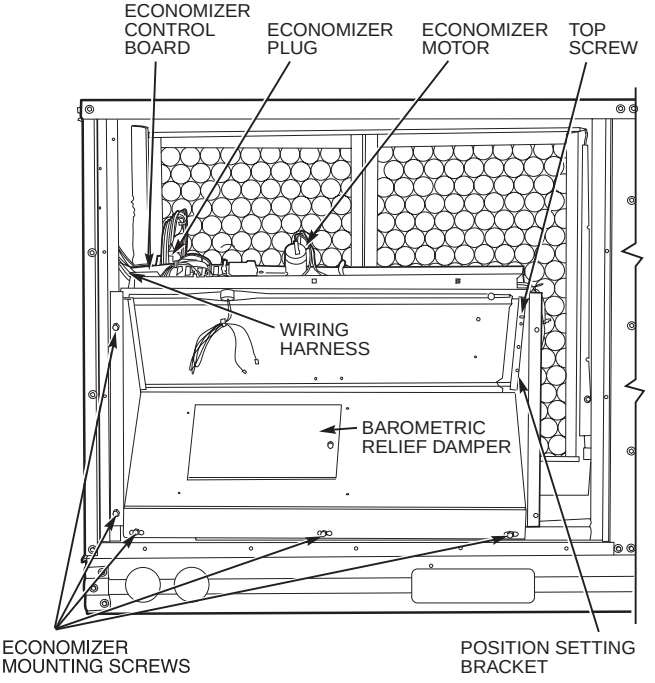
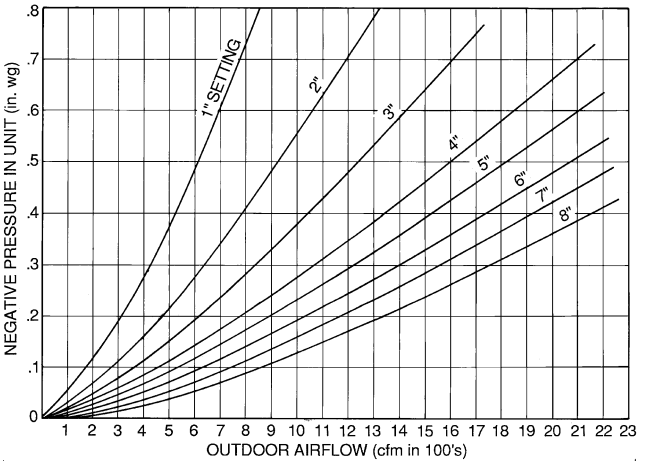


Fig. 23 — Durablade Economizer Installed in Unit



Example:
Given:
Negative Pressure . . . . . 0.2 in. wg
Outdoor Air . . . . . 900 cfm
Determine — Setting — 5 in.

Fig. 24 — Durablade Economizer Minimum Position Setting

Assembly

1. Determine if ventilation air is required in building. If so, determine the minimum amount to be supplied by each unit and record quantity of ventilation air needed for use in Step 5.
2. Remove filter access panel by raising panel and swinging panel outward. Panel is now disengaged from track and can be removed. No tools are required to remove filter access panel. Remove outdoor-air opening panel. Save panels and screws. See Fig. 19.
3. Assemble outdoor-air hood top and side plates as shown in Fig. 20. Install seal strips on hoop top and sides. Put aside screen retainer and retainer screw for later assembly. *Do not attach hood to unit at this time.*
4. Insert economizer plug into economizer harness. Remove tape from barometric relief damper. See Fig. 28.
5. If ventilation is not required, proceed to Step 6. If ventilation air is required, perform the following:
   a. Make sure the factory-installed jumper is in place across terminals P and P1 on the economizer logic module. T and T1 should be disconnected during adjustment.
   b. The 2 potentiometers with slots for adjustment are located on the face of the economizer logic module. Turn the lower potentiometer fully clockwise. The dampers should be fully closed. Turn the potentiometer gradually counterclockwise until the desired position is reached.
   c. Connect T and T1 to the 24V power supply.

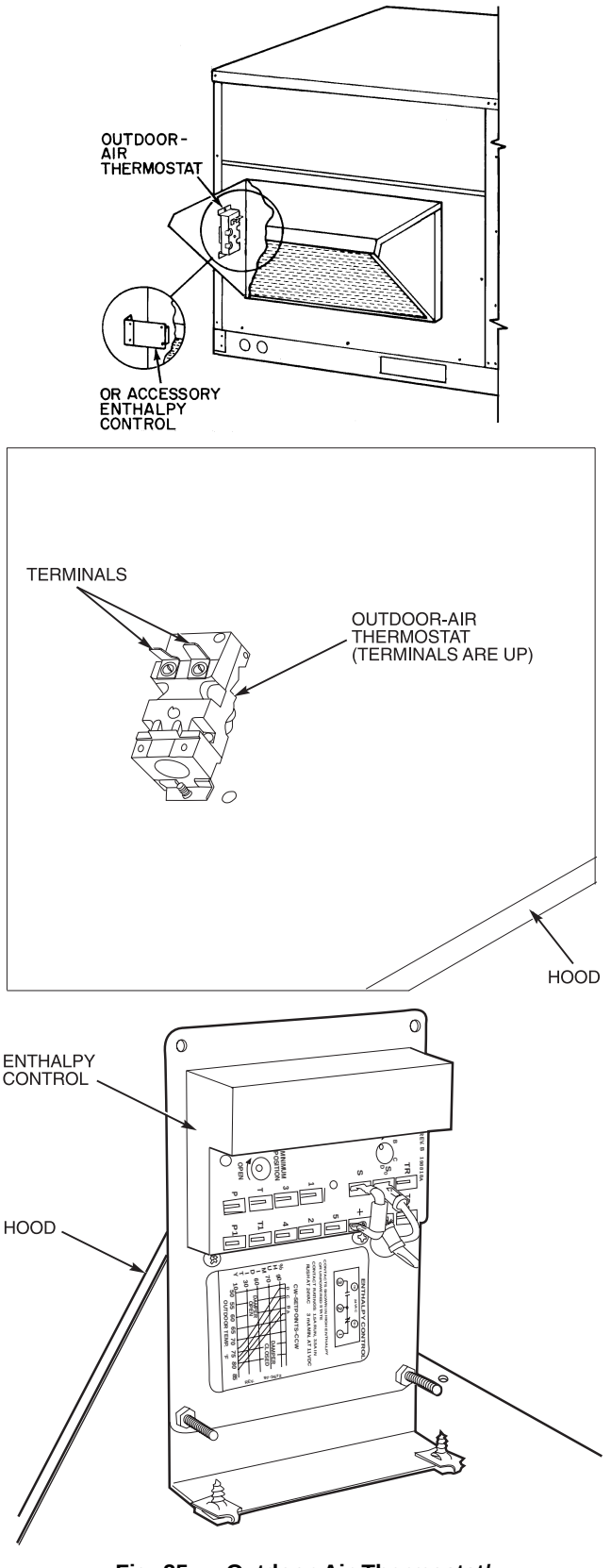


Fig. 25 — Outdoor-Air Thermostat/ Enthalpy Control Installation

OAT — Outdoor-Air Thermostat

NOTE: See unit wiring diagram for details.

Fig. 26 — Wiring Connections for Outdoor-Air Thermostat

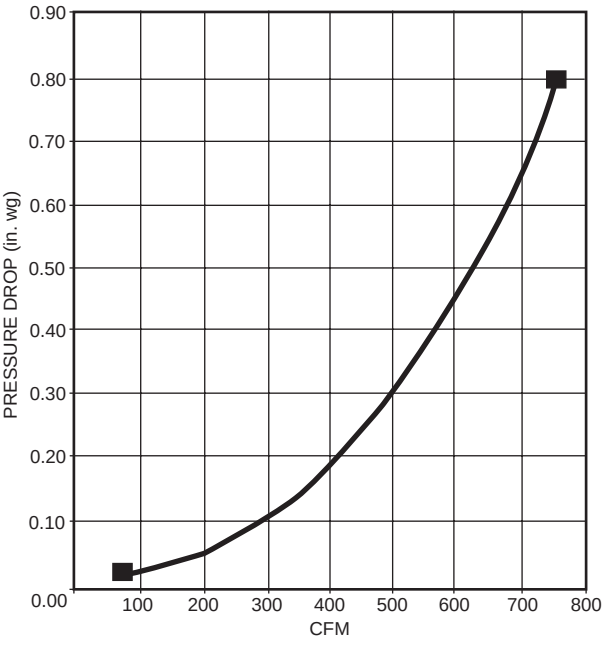


Fig. 27 — Durablade Economizer Barometric Relief Damper Characteristics

d. After installation is complete, calculate the minimum airflow across the economizer. To calculate the minimum airflow, the following data is needed: total cfm (cfm_3), temperature of the total cfm (T_3), temperature of the return air (T_2), and temperature of the entering outside air (T_1). Cfm_1 is the outside air cfm, which will be the minimum airflow.

Insert the data into the following equations:

$$\frac{T_1\,(cfm_1) + T_2\,(cfm_2)}{cfm_3} = T_3$$

$$cfm_2 = (cfm_3 - cfm_1)$$

Therefore:

$$\frac{T_1\,(cfm_1) + T_2\,(cfm_3 - cfm_1)}{cfm_3} = T_3$$

Use this equation to determine cfm_1, which is the minimum airflow across the economizer.

$$cfm_1 = \frac{(T_3 - T_2)\,cfm_3}{(T_1 - T_2)}$$

If cfm_1 does not match the desired minimum airflow from Step 1, readjust the minimum position setting screw.

6. Determine the enthalpy changeover set point from Fig. 28. The enthalpy changeover set point should be set to return the outdoor air damper to the minimum position when enthalpy rises above the set point. The settings are A, B, C, and D. Set the enthalpy changeover per the setting in Fig. 29.
7. Replace outdoor-air opening panel using screws from Step 2. Replace filter access panel. Ensure the filter access panel slides along the tracks and is securely engaged. See Fig. 30.
8. Fasten hood top and side plate assembly (Fig. 31) to outdoor-air opening panel with screws provided.
9. Slide outdoor-air inlet screen into screen track on hood side plate. While holding screen in place, fasten screen retainer to hood using screws provided. See Fig. 32.

NOTE: Refer to Fig. 33 for PARABLADE economizer barometric relief damper characteristics.

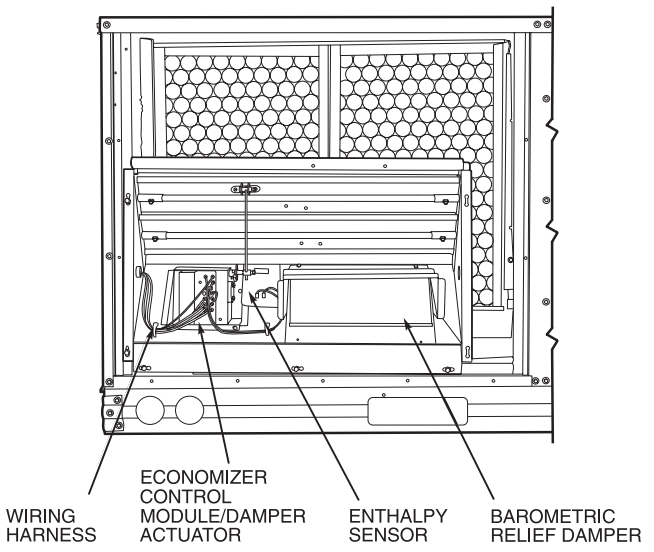
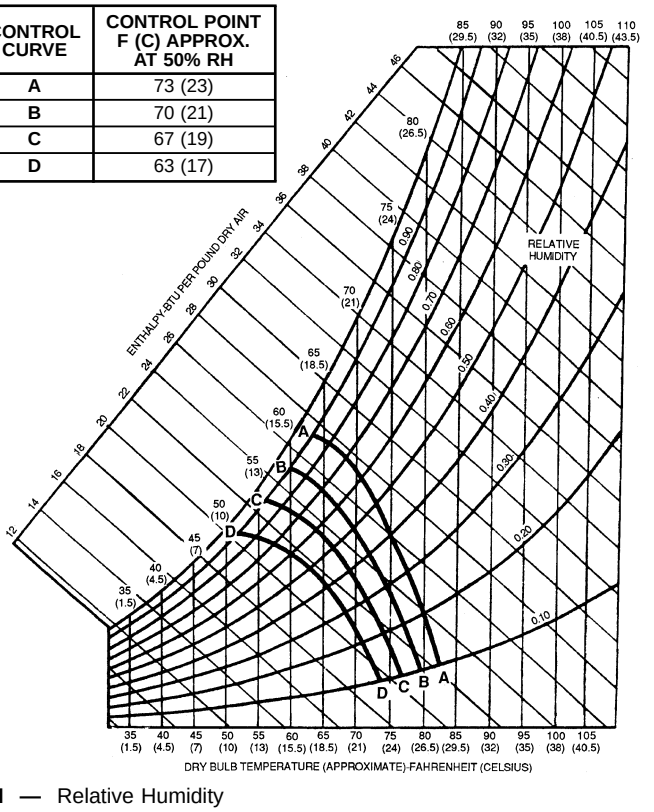


Fig. 28 — PARABLADE Economizer Installed in Unit

CONTROL CURVE	CONTROL POINT F (C) APPROX. AT 50% RH
A	73 (23)
B	70 (21)
C	67 (19)
D	63 (17)



RH — Relative Humidity

Fig. 29 — Enthalpy Settings for PARABLADE Economizer

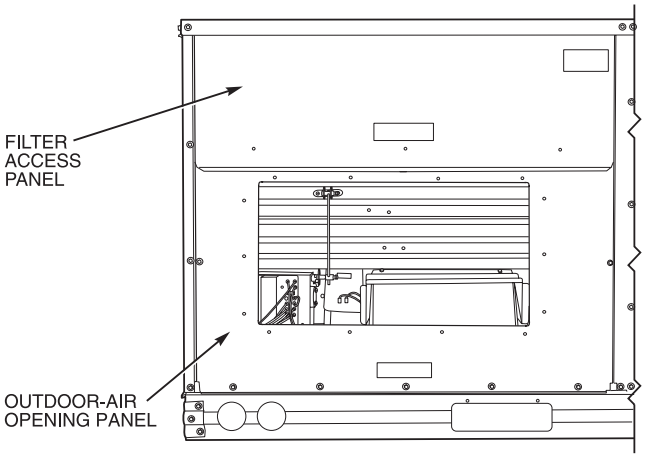


Fig. 30 — Panels Reinstalled On Unit

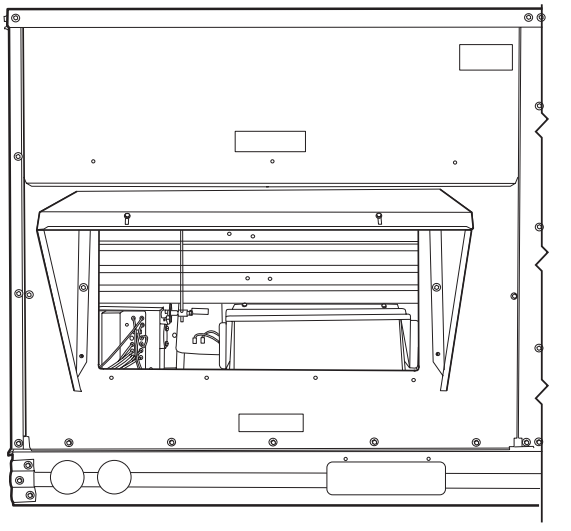


Fig. 31 — Outdoor-Air Hood Installed On Unit

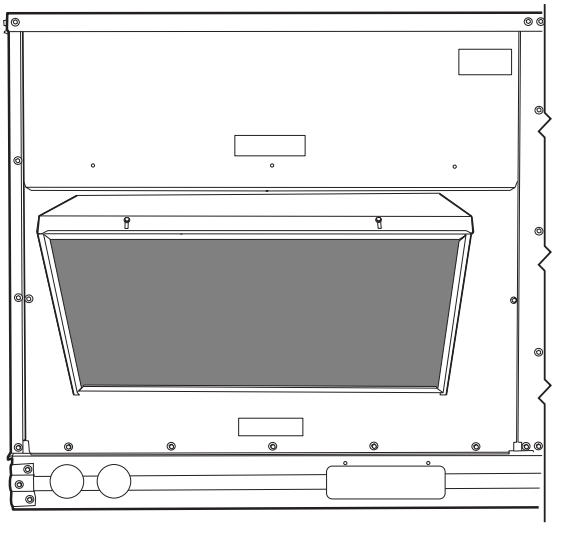


Fig. 32 — Filter Installed on Outdoor-Air Hood

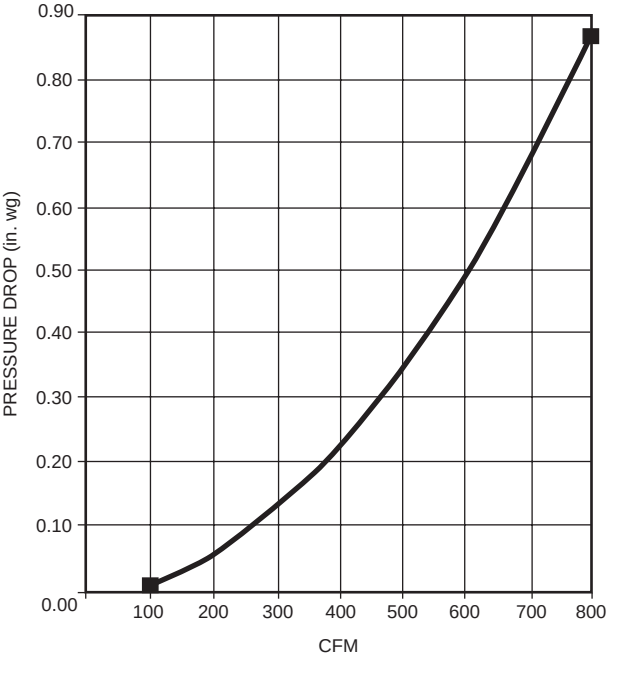


Fig. 33 — PARABLADE Economizer Barometric Relief Damper Characteristics

PRE-START-UP

⚠ **WARNING:** Failure to observe the following warnings could result in serious personal injury:

1. Follow recognized safety practices and wear protective goggles when checking or servicing refrigerant system.
2. Do not operate compressor or provide any electric power to unit unless compressor terminal cover is in place and secured.
3. Do not remove compressor terminal cover until all electrical sources have been disconnected.
4. Relieve all pressure from system before touching or disturbing anything inside terminal box if refrigerant leak is suspected around compressor terminals.
5. Never attempt to repair soldered connection while refrigerant system is under pressure.
6. Do not use torch to remove any component. System contains oil and refrigerant under pressure. To remove a component, wear protective goggles and proceed as follows:
   a. Relieve all pressure from system.
   b. Cut component-connecting tubing with tubing cutter and remove component from unit.
   c. Carefully unsweat remaining tubing stubs when necessary. Oil can ignite when exposed to torch flame.

Proceed as follows to inspect and prepare the unit for initial start-up:

1. Remove all access panels.
2. Read and follow instructions on all WARNING, CAUTION and INFORMATION labels attached to, or shipped with, unit.
3. Make the following inspections:
   a. Inspect for shipping and handling damages such as broken lines, loose parts, disconnected wires, etc.
   b. Inspect for oil at all refrigerant tubing connections and on unit base. Detecting oil generally indicates a refrigerant leak. Leak-test all refrigerant tubing connections using electronic leak detector, halide torch, or liquid-soap solution. If refrigerant leak is detected, see Refrigerant Leaks section on page 30.
   c. Inspect all field- and factory-wiring connections. Be sure that connections are completed and tight.
   d. Inspect coil fins. If damaged during shipping and handling, carefully straighten fins with a fin comb.
4. Verify the following conditions:
   a. Make sure that condenser-fan blade is positioned correctly in fan orifice. *Blades should clear fan motor and fan orifice ring.*
   b. Make sure that air filters are in place.
   c. Make sure that condensate drain pan and trap are filled with water to ensure proper drainage.
   d. Make sure that all tools and miscellaneous loose parts have been removed.
5. Compressors are internally spring mounted. Do not loosen or remove compressor holddown bolts.
6. Each unit system has 4 Schrader-type gage ports: one on the suction line, one on the liquid line and two on the compressor discharge line. Be sure that caps on the ports are tight.

Unit is now ready for initial start-up.

START-UP

I. HEATING SECTION START-UP AND ADJUSTMENTS

⚠ **CAUTION:** Complete the required procedures given in Pre-Start-Up section on this page before starting unit.

Do not jumper any safety devices when operating the unit.

A. Checking Heating Control Operation

Start and check the unit for proper heating control operation as follows:

1. Turn on unit electrical supply.
2. Set system switch selector at HEAT position and fan switch at AUTO. or ON position. Set heating temperature lever above room temperature.
3. The evaporator fan will start immediately, and electric heater will be energized.
4. Check for heating operation by verifying that unit supply outlets are functional.
5. The evaporator fan and heaters will turn off after thermostat temperature is satisfied.

B. Heating Sequence of Operation

Room thermostat calls for heat, closing circuit between R and W1 24-v control terminals. Power to terminal R is supplied through the 24-v transformer, which is internally protected against overload. The 24-v power energizes the indoor (evaporator) fan relay (IFR). The IFR closes normally open contacts 2 to 4, which energize the indoor (evaporator) fan contactor (IFC) and the electric heat contactor, and start the indoor (evaporator) fan motor (IFM). There is no time delay in the start-up of the IFM.

When the call for heat is satisfied, then the R to W1 circuit is opened and the IFR and IFC are deenergized.

Additional information on economizer operating in the heating only mode is provided in Ventilation Sequence section on page 27.

C. Limit Switches

The heating limit switches (LS) are normally closed. If the leaving-air temperature exceeds the maximum allowable temperature, one of the limit switches will open, breaking the power circuit to the heater. This causes the heater to shut down immediately. Check the air quantity to ensure there is sufficient airflow.

If unit does not energize, reset the normally closed manual limit switch (LSM). The LSM reset button is located on the fan housing, and will only open in the event of a fan failure.

D. Airflow and Temperature Rise

The heating operation airflow must produce a temperature rise that falls within the approved cfm range (300 to 500 cfm per 12,000 Btuh cooling).

Refer to Indoor Airflow and Airflow Adjustments section on page 19 to adjust heating airflow where required.

E. Safety Check of Limit Control

A manual reset limit control is located on the evaporator fan. The control shuts off the unit in the event of fan failure.

II. COOLING SECTION START-UP AND ADJUSTMENTS

⚠ **CAUTION:** Complete the required procedures given in the Pre-Start-Up section on page 17 before starting the unit.

Do not jumper any safety devices when operating the unit.

Do not operate the compressor when the outdoor temperature is below 25 F (unless accessory low ambient kit is installed).

Do not rapid-cycle the compressor. Allow 5 minutes between "on" cycles to prevent compressor damage.

A. Checking Cooling Control Operation

Start and check the unit for proper cooling control operation as follows:

1. Place room thermostat SYSTEM switch in OFF position. Observe that blower motor starts when FAN switch is placed in ON position and shuts down when FAN switch is placed in AUTO. position.
2. Place SYSTEM switch in COOL position and FAN switch in AUTO. position. Set cooling control below room temperature. Observe that compressor, condenser fan motor and evaporator-fan motor start. Observe that cooling cycle shuts down when control setting is satisfied.
3. When using an auto-changeover room thermostat, place both SYSTEM and FAN switches in AUTO. positions. Observe that unit operates in Heating mode when temperature control is set above room temperature and operates in Cooling mode when temperature control is set below room temperature.

B. Checking and Adjusting Refrigerant Charge

The refrigerant system is fully charged with R-22 refrigerant, tested and factory-sealed.

NOTE: Adjustment of the refrigerant charge is not required unless the unit is suspected of not having the proper R-22 charge. This unit uses charging charts to determine proper charge. See Refrigerant Charge section on page 30 for further details.

C. Unit Controls

All compressors have the following internal-protection controls:

1. *High-Pressure Relief Valve* — This valve (internal to the compressor) opens when the pressure differential between the low and high sides becomes excessive and will automatically reset when pressure returns to normal.
2. *Compressor Overload* — This overload interrupts power to the compressor when either the current or internal temperature becomes excessive, and automatically resets when the internal temperature drops to a safe level. This overload may require up to 60 minutes (or longer) to reset; therefore, if the internal overload is suspected of being open, disconnect the electrical power to the unit and check the circuit through the overload with an ohmmeter or continuity tester.

D. Compressor Rotation

On 3-phase units with scroll compressors, it is important to be certain compressor is rotating in the proper direction. To determine whether or not compressor is rotating in the proper direction:

1. Connect service gages to suction and discharge pressure fittings.
2. Energize the compressor.
3. The suction pressure should drop and the discharge pressure should rise, as is normal on any start-up.

If the suction pressure does not drop and the discharge pressure does not rise to normal levels:

1. Note that the evaporator fan is probably also rotating in the wrong direction.
2. Turn off power to the unit.
3. Reverse any two of the unit power leads.
4. Reapply power to the compressor.

The suction and discharge pressure levels should now move to their normal start-up levels.

NOTE: When the compressor is rotating in the wrong direction, the unit makes an elevated level of noise and does not provide cooling.

E. Cooling Sequence of Operation

Without Economizer

Room thermostat calls for cooling. Circuit closes between 24-v control circuit terminals R and Y1 and terminals R and G. Power to terminal R is supplied through the 24-v transformer (transformer is internally protected against overload). Terminal G energizes the indoor (evaporator) fan contactor (IFC) through normally closed contacts T and B of the time-delay relay (TDR) and the evaporator fan starts.

The 24-v power through terminal Y1 energizes the compressor contactor (C), starting the compressor and condenser fan.

When the thermostat is satisfied, C1 is deenergized and the compressor and OFM shut off. After a 30-second delay on 036-060 units, the IFM shuts off. If the thermostat fan selector switch is in the ON position, the evaporator motor will run continuously.

Cooling, Units with Durablade Economizer

When the outdoor-air temperature is above the outdoor-air thermostat (OAT) setting and the room thermostat calls for cooling, compressor contactor is energized to start compressor and the outdoor (condenser) fan motor (OFM). The indoor (evaporator) fan motor (IFM) is energied and the economizer damper moves to the minimum position. After the thermostat is satisfied, there is a 30-second delay before the evaporator fan turns off. The damper then moves to the fully closed position. When using continuous fan, the damper moves to the minimum position.

When the outdoor-air temperature is below the OAT setting and the thermostat calls for cooling, the economizer damper moves to the minimum position. If the supply-air temperature is above 57 F, the damper continues to open until it reaches the fully open position or until the supply-air temperature drops below 52 F.

When the supply-air temperature falls to between 57 F and 52 F, the damper will remain at an intermediate open position. If the supply-air temperature falls below 52 F, the damper will modulate closed until it reaches the minimum position or until the supply-air temperature is above 52 F. When the thermostat is satisfied, the damper moves to the fully closed position when using AUTO. fan or to the minimum position when using a continuous fan.

If the outdoor air alone cannot satisfy the cooling requirements of the conditioned space, economizer cooling is integrated with mechanical cooling, providing two stages of cooling. The compressor and the condenser fan will be energized and the position of the economizer damper will be determined by the supply-air temperature. When the second stage

of cooling is satisfied, the compressor and OFM will be deenergized. The damper position will be determined by the supply-air temperature. When the first stage of cooling is satisfied, there is a 30-second delay before the evaporator fan shuts off. The damper then moves to the fully closed position. When using a continous fan, the damper moves to the minimum position. Additional information on economizer operation is provided in the Ventilation Sequence section on page 27.

Cooling, Units With PARABLADE Economizer

When the outdoor-air is above the enthalpy control setting, and the room thermostat calls for cooling, the compressor contactor is energized to start the compressor and the outdoor (condenser) fan motor. The indoor (evaporator) fan motor is energized and the economizer damper moves to the minimum position. After the room thermostat is satisfied the damper will spring return to the fully closed position.

When the outdoor-air is below the enthalpy control setting and the thermostat calls for cooling, the economizer outdoor-air damper is opened proportionally to maintain between 50 and 56 F at the mixed-air sensor. If outside air alone cannot satisfy the cooling requirements, economizer cooling is integrated with mechanical cooling. When the room thermostat is satisfied, the damper will spring return to the full closed position. Additional information on economizer operation is provided in the Ventilation Sequence section on page 27.

Time Guard® II Device

If the unit is equipped with accessory Time Guard II recycle timer, the unit will delay 5 minutes between compressor starts.

Controls Kit

Loss-of-Charge/Low-Pressure Switch (LPS) — When the liquid line pressure drops below 7 psig, the LPS opens 24-v power to the compressor contactor and stops the compressor. When the pressure reaches 22 psig, the switch resets and the compressor is allowed to come back on.

High-Pressure Switch (HPS) — When the refrigerant high-side pressure reaches 428 psig, the HPS opens 24-v power to the compressor contactor and stops the compressor. When the pressure drops to 320 psig, the switch resets and the compressor is allowed to restart.

Freeze-Protection Thermostat (FPT) — When the evaporator-coil leaving refrigerant temperature drops below 30 F, the FPT opens 24-v power to the compressor contactor and stops the compressor. When the leaving refrigerant temperature warms to 45 F, the switch resets and the compressor is allowed to restart.

III. INDOOR AIRFLOW AND AIRFLOW ADJUSTMENTS

⚠ **CAUTION:** For cooling operation, the recommended airflow is 300 to 500 cfm per each 12,000 Btuh of rated cooling capacity. For heating operation, the airflow must produce a temperature rise that falls within the range stamped on the unit rating plate.

Adjust evaporator-fan speed to meet jobsite conditions. Table 3 shows fan rpm at motor pulley settings. Table 4 shows maximum amp draw of belt drive motor. Refer to Tables 5-18 to determine fan speed settings.

A. Direct Drive Motors

The evaporator-fan motor factory speed setting is shown on label diagram affixed to base unit. If other than factory setting is desired, refer to label diagram for motor reconnection.

Table 3 — Fan Rpm at Motor Pulley Settings*

UNIT 558D	MOTOR PULLEY TURNS OPEN										
	0	½	1	1½	2	2½	3	3½	4	4½	5
036†	1090	1055	1025	990	960	925	890	860	825	795	760
048†	1185	1150	1115	1080	1045	1015	980	945	910	875	840
060†	1300	1260	1220	1180	1140	1100	1060	1020	980	940	900
072**	1460	1420	1380	1345	1305	1265	1225	1185	1150	1110	1070

*Approximate fan rpm shown.
†Indicates alternate motor and drive package.
**Indicates standard motor and drive package.

Table 4 — Motor Data

UNIT 558D	EVAPORATOR-FAN MOTOR	MAXIMUM CONTINUOUS BHP*	MAXIMUM OPERATING WATTS*	UNIT VOLTAGE	MAXIMUM AMP DRAW
036	Std	.34	440	208/230	2.9
				460	1.4
				575	1.4
	Alt	1.00	1000	208/230	5.1
				460	2.3
				575	2.3
048	Std	.75	850	208/230	3.7
				460	1.9
				575	1.9
	Alt	1.00	1000	208/230	5.1
				460	2.3
				575	2.3
060	Std	1.20	1340	208/230	6.2
				460	3.4
				575	3.4
	Alt	1.3	1750	208/230†	7.6
		2.4	2120	208/230**	6.1
				460	2.7
				575	2.7
072	Std	2.40	2120	208/230	6.1
				460	2.7
				575	2.7

LEGEND

Bhp — Brake Horsepower

*Extensive motor and electrical testing on these units ensures that the full range of the motors can be utilized with confidence. Using your fan motors up to the ratings shown in this table will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
†Single-Phase motor.
**3-phase motor.

Table 5 — 558D036 Air Delivery — Vertical Discharge Units (Standard Motor)

AIRFLOW (Cfm)	STANDARD DIRECT DRIVE MOTOR							
	Low Speed				High Speed			
	208 v		230, 460, 575 v		208 v		230, 460, 575 v	
	ESP	Watts	ESP	Watts	ESP	Watts	ESP	Watts
900	0.67	253	0.68	277	0.69	307	0.69	363
1000	0.60	270	0.61	292	0.61	321	0.63	374
1100	0.55	287	0.56	307	0.57	335	0.58	385
1200	0.51	304	0.51	323	0.52	349	0.53	397
1300	0.45	321	0.46	338	0.46	364	0.47	408
1400	0.38	338	0.41	354	0.43	378	0.43	420
1500	0.34	355	0.36	369	0.38	392	0.39	431

LEGEND

ESP — External Static Pressure (in. wg)

NOTES:
1. Values include losses for filters, unit casing, and wet coils.
2. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. For additional information on motor performance, refer to Table 4.
3. Use of a field-supplied motor may affect wire sizing. Contact your distributor to verify.
4. To convert watts to bhp:

$$bhp = \frac{\text{watts input x motor efficiency}}{746}$$

Motor efficiency = .63

Table 6 — 558D036 Air Delivery — Vertical Discharge Units (Alternate Motor)

AIRFLOW (Cfm)	ALTERNATE BELT DRIVE MOTOR															
	External Static Pressure (in. wg)															
	0.1		0.2		0.3		0.4		0.5		0.6		0.7		0.8	
	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts
900	**581**	**119**	**673**	**179**	**736**	**219**	805	249	865	288	911	338	957	388	988	428
1000	**644**	**189**	**709**	**219**	782	279	835	298	900	348	937	378	992	438	1039	487
1100	**687**	**219**	**746**	**259**	806	298	867	348	929	398	964	398	1013	487	1068	547
1200	**733**	**259**	785	318	843	348	903	408	960	467	994	497	1045	557	1090	637
1300	**754**	**288**	826	378	891	428	942	477	991	527	1047	597	1075	637	**1122**	**696**
1400	810	348	868	448	937	507	984	567	1032	617	1067	666	**1110**	**726**	**1160**	**766**
1500	841	418	911	527	985	607	1029	656	1073	716	**1109**	**766**	**1150**	**816**	**1190**	**855**

AIRFLOW (Cfm)	ALTERNATE BELT DRIVE MOTOR							
	External Static Pressure (in. wg)							
	0.9		1.0		1.1		1.2	
	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts
900	1039	448	1061	487	1083	527	**1105**	**567**
1000	1061	507	1086	547	**1111**	**587**	**1136**	**627**
1100	1090	577	**1109**	**607**	**1127**	**637**	**1145**	**666**
1200	**1109**	**647**	**1156**	**676**	**1203**	**706**	**1250**	**736**
1300	**1152**	**716**	**1190**	**756**	**1228**	**796**	**1266**	**836**
1400	**1181**	**806**	**1237**	**845**	**1293**	**885**	**1349**	**925**
1500	**1225**	**895**	**1271**	**945**	**1317**	**995**	1363	1044

NOTES:
1. **Boldface** indicates a field-supplied drive is required. (See Note 7.)
2. ▭ indicates field-supplied motor and drive are required.
3. _____ indicates maximum usable watts of a factory-supplied motor.
4. Maximum usable watts input is 1000. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. For additional information on motor performance, refer to Table 4.
5. Values include losses for filters, unit casing, and wet coils.
6. Use of a field-supplied motor may affect wire sizing. Contact your distributor to verify.
7. Alternate motor drive range: 760 to 1090 rpm. All other rpms require field-supplied drive.
8. To convert watts to bhp:

$$\text{bhp} = \frac{\text{watts input x motor efficiency}}{746}$$

Motor efficiency = .75

Table 7 — 558D048 Air Delivery — Vertical Discharge Units (Standard Motor)

AIRFLOW (Cfm)	STANDARD DIRECT DRIVE MOTOR							
	Low Speed				High Speed			
	208 v		230, 460, 575 v		208 v		230, 460, 575 v	
	ESP	Watts	ESP	Watts	ESP	Watts	ESP	Watts
1200	0.93	458	0.94	506	0.94	572	0.99	632
1300	0.86	471	0.87	521	0.87	589	0.92	651
1400	0.78	503	0.79	556	0.79	616	0.87	681
1500	0.70	536	0.73	593	0.73	631	0.80	698
1600	0.61	557	0.64	616	0.66	654	0.76	723
1700	0.51	584	0.54	646	0.58	678	0.68	750
1800	0.40	610	0.44	674	0.51	698	0.63	772
1900	0.29	629	0.37	696	0.46	720	0.56	796
2000	0.25	651	0.30	720	0.39	744	0.50	823

LEGEND

ESP — External Static Pressure (in. wg)

NOTES:
1. Values include losses for filters, unit casing, and wet coils.
2. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. For additional information on motor performance, refer to Table 4.
3. Use of a field-supplied motor may affect wire sizing. Contact your distributor to verify.
4. To convert watts to bhp:

$$\text{bhp} = \frac{\text{watts input x motor efficiency}}{746}$$

Motor efficiency = .66

Table 8 — 558D048 Air Delivery — Vertical Discharge Units (Alternate Motor)

AIRFLOW (Cfm)	ALTERNATE BELT DRIVE MOTOR															
	External Static Pressure (in. wg)															
	0.1		0.2		0.3		0.4		0.6		0.7		0.8		1.0	
	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts
1200	**542**	**168**	**616**	**221**	**678**	**278**	**739**	**336**	842	462	886	525	929	588	1008	704
1300	**576**	**210**	**644**	**263**	**704**	**326**	**764**	**389**	867	525	910	588	952	651	1029	788
1400	**610**	**252**	**673**	**315**	**732**	**378**	**791**	**441**	889	578	933	651	976	725	1052	826
1500	**646**	**294**	**704**	**368**	**761**	**436**	**818**	**504**	912	641	957	720	1001	777	1076	905
1600	**681**	**347**	**735**	**420**	**790**	**494**	845	567	920	695	931	772	1023	848	1100	995
1700	**718**	**410**	**768**	**483**	**836**	**562**	873	641	965	777	1005	853	1045	930	1124	1084
1800	**754**	**473**	**801**	**557**	851	641	900	725	992	858	1032	940	1071	1022	1147	1174
1900	**791**	**546**	**836**	**630**	832	720	828	809	1019	950	1058	1037	1097	1124	1169	1263
2000	**828**	**630**	870	714	864	809	858	904	1046	1053	1085	1139	1124	1237	1194	1373

AIRFLOW (Cfm)	ALTERNATE BELT DRIVE MOTOR									
	External Static Pressure (in. wg)									
	1.1		1.2		1.4		1.6		1.8	
	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts
1200	1052	762	1096	820	1134	835	**1203**	**885**	**1242**	**969**
1300	1065	846	1101	904	1174	1040	1229	1100	1277	1029
1400	1087	890	1121	918	1183	1042	1255	1167	1305	1190
1500	1111	980	1145	1014	1208	1138	1274	1272	1337	1350
1600	1134	1069	1168	1100	1232	1253	1291	1396	1350	1558
1700	1158	1164	1192	1196	1255	1358	1314	1511	1370	1738
1800	1182	1263	1217	1301	1279	1473	1381	1635	1393	1907
1900	1205	1363	1240	1406	1303	1588	1408	1769	1417	2068
2000	1228	1472	1262	1511	1327	1702	1436	1894	1440	2229

NOTES:
1. **Boldface** indicates a field-supplied drive is required. (See Note 7.)
2. ▭ indicates field-supplied motor and drive are required.
3. _____ indicates maximum usable watts of a factory-supplied motor.
4. Maximum usable watts input is 1000. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. For additional information on motor performance, refer to Table 4.
5. Values include losses for filters, unit casing, and wet coils.
6. Use of a field-supplied motor may affect wire sizing. Contact your distributor to verify.
7. Alternate motor drive range: 840 to 1185 rpm. All other rpms require field-supplied drive.
8. To convert watts to bhp:

$$\text{bhp} = \frac{\text{watts input x motor efficiency}}{746}$$

Motor efficiency = .75

Table 9 — 558D060 Air Delivery — Vertical Discharge Units (Standard Motor)

AIRFLOW (Cfm)	STANDARD DIRECT DRIVE MOTOR											
	Low Speed				Medium Speed				High Speed			
	208 v		230, 460, 575 v		208 v		230, 460, 575 v		208 v		230, 460, 575 v	
	ESP	Watts	ESP	Watts	ESP	Watts	ESP	Watts	ESP	Watts	ESP	Watts
1500	0.88	750	1.20	791	1.19	782	1.36	845	1.38	875	1.44	949
1600	0.68	780	1.04	824	1.04	821	1.22	883	1.25	913	1.33	988
1700	0.51	810	0.89	857	0.89	861	1.09	921	1.13	950	1.22	1027
1800	0.35	839	0.73	891	0.74	900	0.96	959	1.00	988	1.11	1066
1900	0.26	873	0.58	924	0.59	940	0.86	997	0.88	1025	1.00	1105
2000	0.18	905	0.42	957	0.44	979	0.73	1035	0.78	1063	0.92	1144
2100	0.08	940	0.27	990	0.29	1018	0.59	1073	0.63	1101	0.81	1183
2200	—	—	0.19	1023	0.19	1035	0.46	1111	0.49	1138	0.69	1222
2300	—	—	0.11	1056	0.11	1076	0.34	1149	0.41	1176	0.59	1261
2400	—	—	0.03	1096	0.04	1113	0.19	1187	0.22	1213	0.43	1300
2500	—	—	—	—	—	—	0.09	1225	0.12	1251	0.34	1340

LEGEND

ESP — External Static Pressure (in. wg)

NOTES:
1. Values include losses for filters, unit casing, and wet coils.
2. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. For additional information on motor performance, refer to Table 4.
3. Use of field-supplied motor may affect wire sizing. Contact your distributor to verify.
4. To convert watts to bhp:

$$\text{bhp} = \frac{\text{watts input x motor efficiency}}{746}$$

Motor efficiency = .67

Table 10 — 558D060 Air Delivery — Vertical Discharge Units (Alternate Motor)

AIRFLOW (Cfm)	ALTERNATE BELT DRIVE MOTOR																			
	External Static Pressure (in. wg)																			
	0.1		0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8	
	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts
1500	**730**	**347**	**789**	**409**	**896**	**542**	990	685	1072	848	1153	1022	1221	1196	1256	1328	1280	1349	**1320**	**1400**
1600	**770**	**409**	**826**	**470**	931	623	1020	766	1101	930	1178	1114	1252	1298	**1311**	**1482**	**1340**	**1615**	**1380**	**1645**
1700	**811**	**480**	**865**	**552**	966	705	1051	858	1133	1032	1205	1206	1278	1400	**1345**	**1604**	**1397**	**1799**	**1424**	**1931**
1800	**852**	**562**	905	634	1002	797	1084	950	1163	1124	1235	1318	**1303**	**1512**	**1371**	**1727**	**1433**	**1942**	1480	2136
1900	**894**	**552**	945	736	1037	899	1119	1063	1194	1237	1266	1431	**1330**	**1625**	**1396**	**1850**	**1460**	**2074**	1517	2299
2000	936	756	984	838	1072	1001	1154	1185	1226	1359	1297	1564	**1362**	**1768**	**1422**	**1983**	1485	2207	1544	2453
2100	978	869	1024	950	1108	1124	1192	1318	1259	1502	**1327**	**1696**	**1393**	**1911**	1452	2126	1510	2361	1569	2606
2200	1021	991	1064	1073	1145	1247	1225	1461	1294	1656	**1359**	**1850**	**1423**	**2064**	1483	2289	1538	2514	1595	2769
2300	1064	1124	1104	1206	1183	1390	1260	1604	**1330**	**1819**	**1392**	**2013**	1454	2228	1515	2463	1569	2698	1622	2943
2400	1107	1267	1145	1349	1222	1482	1296	1768	**1365**	**1983**	1426	2197	1485	2412	1544	2647	1601	2902	1652	3137
2500	1150	1420	1186	1512	1262	1717	**1331**	**1931**	1400	2166	1461	2391	1518	2606	1575	2841	1631	3096	1684	3352

NOTES:
1. **Boldface** indicates a field-supplied drive is required. (See Note 7.)
2. ▭ indicates field-supplied motor and drive are required.
3. _____ indicates maximum usable watts of a factory-supplied motor.
4. Maximum usable watts input is 2120. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. For additional information on motor performance, refer to Table 4.
5. Values include losses for filters, unit casing, and wet coils.
6. Use of a field-supplied motor may affect wire sizing. Contact your distributor to verify.
7. Alternate motor drive range: 900 to 1300. All other rpms require field-supplied drive.
8. To convert watts to bhp:

$$\text{bhp} = \frac{\text{watts input x motor efficiency}}{746}$$

Motor efficiency = .74

Table 11 — 558C072 Air Delivery — Vertical Discharge Units (Standard Motor)

AIRFLOW (Cfm)	STANDARD BELT DRIVE MOTOR																	
	External Static Pressure (in. wg)																	
	0.1		0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6	
	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts
1800	**852**	**562**	**905**	**615**	**1002**	**739**	1084	859	1163	998	1235	1156	1303	1318	1371	1499	1433	1638
1900	**894**	**630**	**945**	**692**	**1037**	**818**	1119	948	1194	1089	1266	1250	1330	1413	1396	1604	1460	1796
2000	**936**	**708**	**984**	**771**	1072	899	1154	1047	1226	1190	1297	1361	1362	1534	1422	1718	**1485**	**1910**
2100	**978**	**795**	**1024**	**859**	1108	998	1190	1156	1259	1310	1327	1473	1393	1656	1452	1840	**1510**	**2041**
2200	**1021**	**891**	**1064**	**956**	1145	1097	1225	1275	1294	1439	1359	1604	1423	1779	**1483**	**1980**	1538	2171
2300	**1064**	**998**	1104	1064	1183	1216	1260	1396	1330	1578	1392	1744	1454	1927	1515	2128	1569	2326
2400	1107	1114	1145	1182	1222	1353	1296	1534	1365	1718	1426	1901	**1485**	**2084**	1544	2283	1601	2459
2500	1150	1241	1186	1318	1262	1491	1331	1674	1400	1875	**1461**	**2067**	1518	2249	1575	2445	—	—
2600	1193	1387	1228	1465	1301	1648	1367	1831	1435	2041	1497	2240	1552	2428	—	—	—	—
2700	1237	1543	1269	1621	1341	1814	1404	1997	1471	2214	1532	2420	—	—	—	—	—	—
2800	1280	1718	1311	1796	1381	1989	1442	2180	1506	2394	—	—	—	—	—	—	—	—
2900	1324	1901	1354	1980	1420	2180	1481	2369	1542	2579	—	—	—	—	—	—	—	—
3000	1368	2093	1396	2171	1460	2369	1521	2571	—	—	—	—	—	—	—	—	—	—

NOTES:
1. **Boldface** indicates field-supplied drive required. (See Note 7.)
2. ▭ indicates field-supplied motor and drive are required.
3. _____ indicates maximum usable watts of a factory-supplied motor.
4. Maximum usable watts input is 2120. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. For additional information on motor performance, refer to Table 4.
5. Values include losses for filters, unit casing and wet coils.
6. Use of a field-supplied motor may affect wire sizing. Contact your distributor to verify.
7. Standard motor drive range: 1070 to 1460. All other rpms require field-supplied drive.
8. To convert watts to bhp:

$$\text{bhp} = \frac{\text{watts input x motor efficiency}}{746}$$

Motor efficiency = .84

Table 12 — 558D036 Air Delivery — Horizontal Discharge Units (Standard Motor)

AIRFLOW (Cfm)	STANDARD DIRECT DRIVE MOTOR							
	Low Speed				High Speed			
	208 v		230, 460, 575 v		208 v		230, 460, 575 v	
	ESP	Watts	ESP	Watts	ESP	Watts	ESP	Watts
900	0.72	253	0.75	277	0.73	307	0.76	363
1000	0.67	270	0.69	292	0.70	321	0.71	374
1100	0.61	287	0.63	307	0.64	335	0.65	385
1200	0.57	304	0.58	323	0.56	349	0.59	397
1300	0.51	321	0.53	338	0.53	364	0.54	408
1400	0.44	338	0.46	354	0.47	378	0.48	420
1500	0.39	355	0.41	369	0.43	392	0.43	431

LEGEND

ESP — External Static Pressure (in. wg)

NOTES:
1. Values include losses for filters, unit casing, and wet coils.
2. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. For additional information on motor performance, refer to Table 4.
3. Use of a field-supplied motor may affect wire sizing. Contact your distributor to verify.
4. To convert watts to bhp:

$$\text{bhp} = \frac{\text{watts input x motor efficiency}}{746}$$

Motor efficiency = .63

Table 13 — 558D036 Air Delivery — Horizontal Discharge Units (Alternate Motor)

AIRFLOW (Cfm)	ALTERNATE BELT DRIVE MOTOR															
	External Static Pressure (in. wg)															
	0.1		0.2		0.3		0.4		0.5		0.6		0.7		0.8	
	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts
900	**526**	**70**	**584**	**99**	**656**	**139**	**734**	**219**	818	269	875	269	924	308	953	348
1000	**570**	**109**	**627**	**149**	**736**	**189**	800	259	848	288	895	308	936	348	977	388
1100	**614**	**149**	**670**	**189**	**758**	**229**	812	288	863	308	914	348	960	388	1005	428
1200	**658**	**189**	**710**	**229**	780	279	840	318	889	358	938	398	988	448	1038	497
1300	**703**	**239**	**752**	**269**	808	318	868	368	916	408	963	448	1012	507	1061	557
1400	**725**	**288**	776	308	845	378	891	418	937	467	983	507	1027	557	1071	597
1500	**755**	**328**	816	378	870	428	924	477	969	527	1014	577	1056	627	**1097**	**676**

AIRFLOW (Cfm)	ALTERNATE BELT DRIVE MOTOR							
	External Static Pressure (in. wg)							
	0.9		1.0		1.1		1.2	
	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts
900	989	388	1028	438	1074	487	**1120**	**537**
1000	1020	438	1064	477	**1124**	**537**	**1185**	**597**
1100	1052	487	**1100**	**527**	**1163**	**587**	**1225**	**647**
1200	1076	527	**1136**	**577**	**1201**	**647**	**1266**	**716**
1300	1090	607	**1172**	**647**	**1239**	**716**	**1306**	**786**
1400	**1108**	**666**	**1208**	**706**	**1278**	**786**	**1347**	**865**
1500	**1117**	**696**	**1245**	**776**	**1315**	**865**	**1385**	**955**

NOTES:
1. **Boldface** indicates a field-supplied drive is required. (See Note 4.)
2. Maximum usable watts input is 1000. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. For additional information on motor performance, refer to Table 4.
3. Values include losses for filters, unit casing, and wet coils.
4. Alternate motor drive range: 760 to 1090 rpm. All other rpms require field-supplied drive.
5. To convert watts to bhp:

$$\text{bhp} = \frac{\text{watts input x motor efficiency}}{746}$$

Motor efficiency = .75

Table 14 — 558D048 Air Delivery — Horizontal Discharge Units (Standard Motor)

AIRFLOW (Cfm)	STANDARD DIRECT DRIVE MOTOR							
	Low Speed				High Speed			
	208 v		230, 460, 575 v		208 v		230, 460, 575 v	
	ESP	Watts	ESP	Watts	ESP	Watts	ESP	Watts
1200	0.93	458	0.97	506	1.04	572	1.09	632
1300	0.86	471	0.90	521	0.96	589	1.02	651
1400	0.78	503	0.84	556	0.90	616	0.96	681
1500	0.73	536	0.76	593	0.83	631	0.89	698
1600	0.67	557	0.70	616	0.75	654	0.82	723
1700	0.60	584	0.63	646	0.67	678	0.74	750
1800	0.51	610	0.54	674	0.62	698	0.69	772
1900	0.40	629	0.45	696	0.54	720	0.62	796
2000	0.32	661	0.33	731	0.47	744	0.54	823

LEGEND

ESP — External Static Pressure (in. wg)

NOTES:
1. Values include losses for filters, unit casing, and wet coils.
2. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. For additional information on motor performance, refer to Table 4.
3. Use of a field-supplied motor may affect wire sizing. Contact your distributor to verify.
4. To convert watts to bhp:

$$\text{bhp} = \frac{\text{watts input x motor efficiency}}{746}$$

Motor efficiency = .66

Table 15 — 558D048 Air Delivery — Horizontal Discharge Units (Alternate Motor)

AIRFLOW (Cfm)	ALTERNATE BELT DRIVE MOTOR															
	External Static Pressure (in. wg)															
	0.1		0.2		0.3		0.4		0.6		0.7		0.8		1.0	
	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts
1200	**514**	**158**	**590**	**210**	**657**	**263**	**723**	**315**	**828**	**441**	876	510	924	578	999	674
1300	**545**	**189**	**615**	**242**	**680**	**305**	**744**	**368**	849	494	895	562	940	630	1025	756
1400	**577**	**221**	**642**	**284**	**704**	**347**	**766**	**410**	870	546	915	620	959	693	1042	828
1500	**609**	**273**	**670**	**326**	**729**	**394**	**788**	**462**	892	609	936	683	980	757	1060	899
1600	**642**	**315**	**699**	**378**	**755**	**447**	**811**	**515**	913	672	957	751	1001	830	1080	971
1700	**675**	**378**	**728**	**441**	**782**	**510**	**836**	**578**	935	746	979	825	1023	904	1101	1053
1800	**709**	**431**	**759**	**504**	**810**	**578**	860	651	957	820	1001	904	1044	988	1122	1134
1900	**743**	**504**	**790**	**578**	**838**	**651**	886	725	980	904	1023	993	1066	1082	1143	1237
2000	**778**	**578**	**836**	**651**	875	730	913	809	1004	988	1046	1082	1088	1177	1165	1339

AIRFLOW (Cfm)	ALTERNATE BELT DRIVE MOTOR									
	External Static Pressure (in. wg)									
	1.1		1.2		1.4		1.6		1.8	
	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts
1200	1018	685	1036	695	1073	756	1109	794	1138	851
1300	1058	807	1090	858	1121	832	1159	918	**1193**	**976**
1400	1080	899	1118	971	1175	1014	1206	1042	1244	1138
1500	1098	981	1136	1063	1205	1138	1258	1243	1289	1282
1600	1117	1058	1153	1140	1224	1234	1287	1387	1337	1492
1700	1137	1139	1172	1226	1241	1320	1307	1492	1366	1655
1800	1157	1226	1192	1318	1258	1415	1323	1597	1385	1779
1900	1179	1328	1214	1420	1279	1511	1341	1702	1402	1894
2000	1200	1431	1235	1523	1300	1616	1361	1817	1419	2008

NOTES:
1. **Boldface** indicates a field-supplied drive is required. (See Note 7.)
2. ▭ indicates field-supplied motor and drive are required.
3. _____ indicates maximum usable watts of a factory-supplied motor.
4. Maximum usable watts input is 1000. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. For additional information on motor performance, refer to Table 4.
5. Values include losses for filters, unit casing, and wet coils.
6. Use of a field-supplied motor may affect wire sizing. Contact your distributor to verify.
7. Alternate motor drive range: 840 to 1185 rpm. All other rpms require field-supplied drive.
8. To convert watts to bhp:

$$\text{bhp} = \frac{\text{watts input x motor efficiency}}{746}$$

Motor efficiency = .75

Table 16 — 558D060 Air Delivery — Horizontal Discharge Units (Standard Motor)

AIRFLOW (Cfm)	STANDARD DIRECT DRIVE MOTOR											
	Low Speed				Medium Speed				High Speed			
	208 v		230, 460, 575 v		208 v		230, 460, 575 v		208 v		230, 460, 575 v	
	ESP	Watts	ESP	Watts	ESP	Watts	ESP	Watts	ESP	Watts	ESP	Watts
1500	1.01	750	1.25	791	1.26	782	1.46	845	1.46	875	1.52	949
1600	0.82	780	1.09	824	1.11	821	1.32	883	1.33	913	1.41	988
1700	0.64	810	0.97	857	0.99	861	1.22	921	1.24	950	1.33	1027
1800	0.44	839	0.81	891	0.84	900	1.09	959	1.11	988	1.22	1066
1900	0.32	869	0.66	924	0.69	940	0.96	997	0.99	1025	1.11	1105
2000	0.21	899	0.47	957	0.51	979	0.80	1035	0.83	1063	0.97	1144
2100	0.13	929	0.32	990	0.36	1018	0.64	1073	0.71	1101	0.86	1183
2200	0.05	959	0.19	1023	0.21	1058	0.50	1111	0.58	1138	0.75	1222
2300	—	—	0.08	1057	0.08	1097	0.34	1149	0.39	1176	0.57	1261
2400	—	—	—	—	—	—	0.24	1187	0.29	1213	0.49	1300
2500	—	—	—	—	—	—	0.15	1225	0.15	1251	0.34	1340

LEGEND

ESP — External Static Pressure (in. wg)

NOTES:
1. Values include losses for filters, unit casing, and wet coils.
2. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. For additional information on motor performance, refer to Table 4.
3. Use of field-supplied motor may affect wire sizing. Contact your distributor to verify.
4. To convert watts to bhp:

$$\text{bhp} = \frac{\text{watts input} \times \text{motor efficiency}}{746}$$

Motor efficiency = .67

Table 17 — 558D060 Air Delivery — Horizontal Discharge Units (Alternate Motor)

AIRFLOW (Cfm)	ALTERNATE BELT DRIVE MOTOR																			
	External Static Pressure (in. wg)																			
	0.1		0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8	
	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts
1500	**658**	**276**	**722**	**337**	**840**	**470**	937	603	1027	756	1108	920	1186	1104	1263	1328	**1343**	**1615**	**1431**	**1829**
1600	**693**	**327**	**754**	**388**	**867**	**531**	963	664	1052	828	1130	991	1205	1175	1278	1380	**1350**	**1645**	**1424**	**1921**
1700	**729**	**388**	**787**	**450**	**895**	**593**	991	746	1075	899	1154	1083	1226	1257	1296	1451	**1364**	**1676**	**1432**	**1931**
1800	**765**	**460**	**821**	**521**	923	664	1019	828	1099	981	1178	1165	1249	1349	**1316**	**1553**	**1382**	**1758**	**1447**	**1993**
1900	**802**	**531**	**854**	**593**	953	746	1046	920	1126	1083	1201	1257	1274	1461	**1338**	**1656**	**1402**	**1870**	**1464**	**2095**
2000	**840**	**613**	900	674	984	838	1073	1012	1154	1185	1226	1359	1297	1564	**1363**	**1768**	**1424**	**1983**	1484	2207
2100	**878**	**705**	923	766	1015	930	1101	1104	1182	1298	1252	1482	**1320**	**1676**	**1388**	**1891**	**1448**	**2115**	1505	2340
2200	916	797	958	869	1046	1032	1129	1216	1209	1420	1280	1615	**1345**	**1809**	**1410**	**2013**	1473	2248	1529	2483
2300	954	910	993	981	1079	1155	1160	1339	1237	1543	**1309**	**1747**	**1372**	**1952**	1434	2156	1496	2391	1554	2637
2400	993	1022	1029	1093	1112	1277	1190	1461	1264	1666	**1336**	**1891**	**1400**	**2105**	1459	2310	1519	2534	1578	2820
2500	1031	1155	1066	1226	1145	1420	1220	1640	1292	1809	**1363**	**2044**	1428	2269	1486	2483	1543	2708	1600	2953

NOTES:
1. **Boldface** indicates a field-supplied drive is required. (See Note 7.)
2. ▭ indicates field-supplied motor and drive are required.
3. _____ indicates maximum usable watts of a factory-supplied motor.
4. Maximum usable watts input is 2120. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. For additional information on motor performance, refer to Table 4.
5. Values include losses for filters, unit casing, and wet coils.
6. Use of a field-supplied motor may affect wire sizing. Contact your distributor to verify.
7. Alternate motor drive range: 900 to 1300. All other rpms require field-supplied drive.
8. To convert watts to bhp:

$$\text{bhp} = \frac{\text{watts input} \times \text{motor efficiency}}{746}$$

Motor efficiency = .74

Table 18 — 558D072 Air Delivery — Horizontal Discharge Units (Standard Motor)

AIRFLOW (Cfm)	STANDARD BELT DRIVE MOTOR																	
	External Static Pressure (in. wg)																	
	0.1		0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6	
	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts	Rpm	Watts
1800	**765**	**487**	**821**	**532**	**923**	**638**	**1019**	**843**	1099	883	1178	1031	1249	1182	1316	1353	1382	1526
1900	**802**	**539**	**854**	**585**	**953**	**700**	**1046**	**835**	1126	965	1201	1106	1274	1275	1338	1439	1402	1621
2000	**840**	**600**	**888**	**646**	**984**	**771**	1073	907	1154	1047	1226	1990	1297	1361	1363	1534	1424	1718
2100	**878**	**669**	**923**	**716**	**1015**	**843**	1101	981	1182	1140	1252	1292	1320	1456	1388	1639	1448	1831
2200	**916**	**739**	**958**	**795**	**1046**	**924**	1129	1072	1209	1241	1280	1404	1345	1569	1410	1744	**1473**	**1945**
2300	**954**	**827**	**993**	**883**	1079	1022	1160	1173	1237	1344	1309	1517	1372	1691	1434	1866	**1496**	**2067**
2400	**993**	**916**	**1029**	**973**	1112	1123	1190	1275	1264	1447	1336	1639	1400	1823	1459	1997	1519	2188
2500	**1031**	**1022**	**1066**	**1081**	1145	1241	1220	1396	1292	1569	1363	1770	1428	1962	1486	2145	1543	2335
2600	1070	1131	1103	1199	1179	1353	1251	1517	1322	1700	1390	1901	1456	2102	1514	2300	1569	2487
2700	1109	1258	1140	1318	1212	1482	1283	1656	1352	1849	1418	2041	1483	2257	1543	2462	—	—
2800	1148	1396	1177	1465	1246	1621	1316	1805	1383	1997	1446	2188	1510	2403	—	—	—	—
2900	1188	1543	1215	1604	1281	1770	1349	1962	1413	2154	1476	2352	1537	2562	—	—	—	—
3000	1227	1700	1253	1770	1316	1936	1382	2136	1444	2317	1506	2529	—	—	—	—	—	—

NOTES:
1. **Boldface** indicates field-supplied drive required. (See Note 7.)
2. ▭ indicates field-supplied motor and drive are required.
3. _____ indicates maximum usable watts of a factory-supplied motor.
4. Maximum usable watts input is 2120. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. For additional information on motor performance, refer to Table 4.
5. Values include losses for filters, unit casing, and wet coils.
6. Use of a field-supplied motor may affect wire sizing. Contact your distributor to verify.
7. Standard motor drive range: 1070 to 1460. All other rpms require field-supplied drive.
8. To convert watts to bhp:

$$\text{bhp} = \frac{\text{watts input} \times \text{motor efficiency}}{746}$$

Motor efficiency = .84

B. Belt Drive Motors

Fan motor pulleys are factory set for speed shown in Table 1.

To change fan speed:

1. Shut off unit power supply.
2. Loosen belt by loosening fan motor mounting nuts. See Fig. 34.
3. Loosen movable pulley flange setscrew (see Fig. 35).
4. Screw movable flange toward fixed flange to increase speed and away from fixed flange to decrease speed. Increasing fan speed increases load on motor. Do not exceed maximum speed specified in Table 1.
5. Set movable flange at nearest keyway of pulley hub and tighten setscrew. (See Table 1 for speed change for each full turn of pulley flange.)

To align fan and motor pulleys:

1. Loosen fan pulley setscrews.
2. Slide fan pulley along fan shaft.
3. Make angular alignment by loosening motor from mounting.

To adjust belt tension:

1. Loosen fan motor nuts.
2. Slide motor mounting plate away from fan scroll for proper belt tension (½-in. deflection with one finger).
3. Tighten motor mounting nuts.
4. Adjust lock bolt and nut on mounting plate to secure motor in fixed position.

C. Ventilation Sequence

If unit is equipped with economizer, the damper will open to the minimum position whenever the evaporator fan runs.

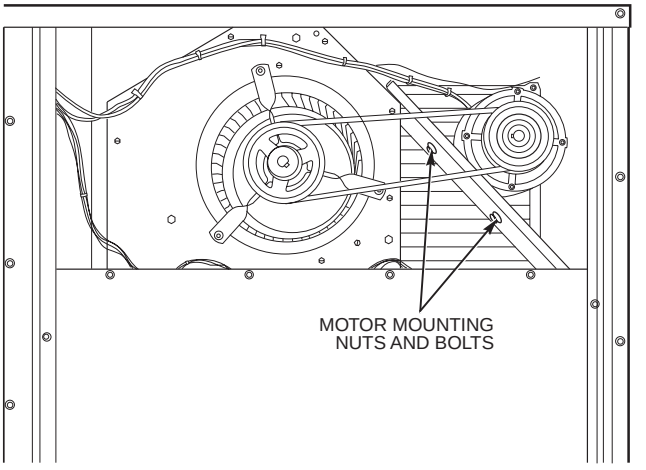


Fig. 34 — Belt-Drive Motor Mounting

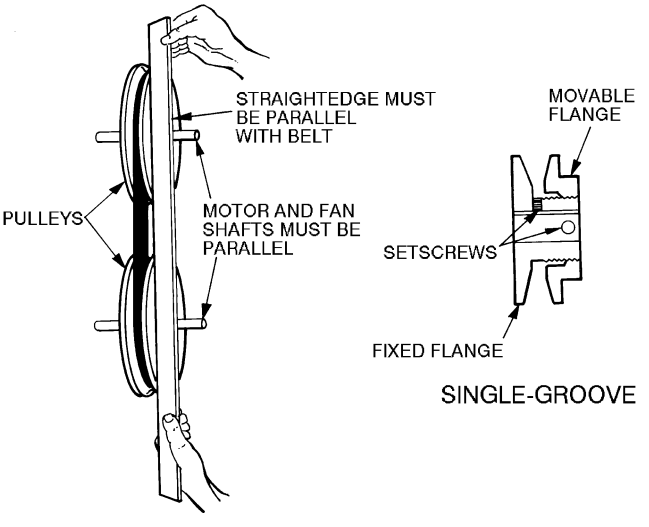


Fig. 35 — Evaporator-Fan Pulley Adjustment

Whenever the evaporator fan is energized (during heating, cooling or continuous fan), 24-v power is on terminal IFO on the economizer or two-position damper control board. The damper motor will be energized with 12-vdc power and the damper will drive open until SW3 on the damper is deactivated. The damper motor will stop, and damper will remain in the minimum ventilation position until the evaporator fan is shut off. When the evaporator fan is shut off, the damper motor is again energized and the damper runs closed until SW2 is activated and the damper motor turns off.

CARE AND MAINTENANCE

To ensure continuing high performance, and to minimize the possibility of premature equipment failure, periodic maintenance must be performed on this equipment. This combination heating/cooling unit should be inspected at least once each year by a qualified service person.

NOTE TO EQUIPMENT OWNER: Consult your local dealer about the availability of a maintenance contract.

⚠ **WARNING:** The ability to properly perform maintenance on this equipment requires certain expertise, mechanical skills, tools, and equipment. If you do not possess these, do not attempt to perform any maintenance on this equipment other than those procedures recommended in the User's Information Manual. FAILURE TO HEED THIS WARNING COULD RESULT IN SERIOUS PERSONAL INJURY AND POSSIBLE DAMAGE TO THIS EQUIPMENT.

The minimum maintenance requirements for this equipment are as follows:

1. Inspect air filters each month. Clean or replace when necessary.
2. Inspect cooling coil, drain pan, and condensate drain each cooling season for cleanliness. Clean when necessary.
3. Inspect fan motor and wheel. Clean and lubricate as necessary.
4. Check electrical connections for tightness and controls for proper operation each heating and cooling season. Service when necessary.
5. Check and inspect accessory electric heaters before each heating season. Clean and adjust when necessary.
6. Check and clean outdoor-air inlet screen if needed.

⚠ **WARNING:** Failure to follow these warnings could result in serious personal injury:

1. Turn off electrical power to the unit before performing any maintenance or service on the unit.
2. Use extreme caution when removing panels and parts. As with any mechanical equipment, personal injury can result from sharp edges, etc.
3. Never place anything combustible either on, or in contact with, the unit.

I. AIR FILTER

⚠ **CAUTION:** Never operate the unit without a suitable air filter in the return-air duct system. Always replace the filter with the same dimensional size and type as originally installed. See Table 1 for recommended filter sizes.

Inspect air filters at least once each month and replace (throwaway-type) or clean (cleanable-type) at least twice during each heating and cooling season, or whenever the filter(s) becomes clogged with dust and lint.

When necessary, replace filters with the same dimensional size and type as originally provided.

SERVICE

⚠ **CAUTION:** When servicing unit, shut off all electrical power to unit to avoid shock hazard or injury from rotating parts.

I. CLEANING

Inspect unit interior at the beginning of each heating and cooling season and as operating conditions require.

A. Evaporator Coil

1. Turn unit power off. Remove evaporator coil access panel.
2. If accessory economizer is installed, remove economizer by disconnecting Molex plug and economizer mounting screws. Refer to Optional Economizer sections on page 13 or Accessory Economizer Installation Instructions for further details.
3. Slide filters out of unit.
4. Clean coil using a commercial coil cleaner or dishwasher detergent in a pressurized spray canister. Wash both sides of coil and flush with clean water. For best results, backflush toward return-air section to remove foreign material.
5. Flush condensate pan.
6. Reinstall economizer and filters.
7. Reconnect wiring.
8. Replace access panels.

B. Condenser Coil

Inspect coil monthly. Clean condenser coil annually, and as required by location or outdoor-air conditions.

<u>One-Row Coils (sizes 036-060)</u>

To access one-row coils, remove screws securing condenser-fan grille to condenser coil top cover. Place grille on top of condenser coil top cover as shown in Fig. 36. It is not necessary to remove the top cover.

Use a water hose or other suitable equipment to remove dirt and debris. Clean the outer surfaces with a stiff brush in the normal manner.

Reverse the procedure outlined above to reinstall the condenser-fan grille and condenser coil top cover.

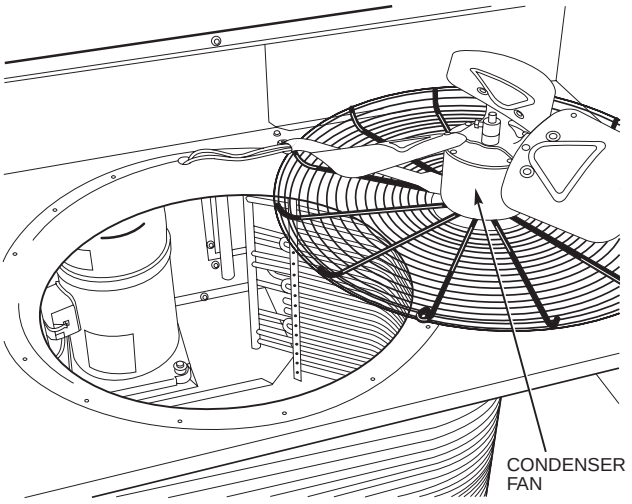


Fig. 36 — Condenser Coil Cleaning

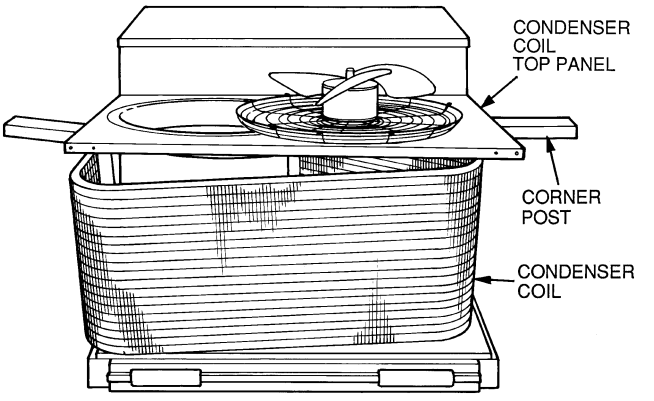


Fig. 37 — Propping Up Condenser Coil Top Cover

Two-Row Coils (size 072)

NOTE: Save all screws removed in this section. The screws must be used when reinstalling the equipment.

1. To access 2-row coils, remove screws securing condenser-fan grille to condenser coil top cover. Place grille on top of condenser coil top cover as shown in Fig. 36. It is not necessary to remove the top cover.
2. Remove 3 screws on right side of compressor access panel. Remove one screw securing condenser coil top cover to compressor access panel. Remove lower screw securing condenser coil to compressor mounting plate. See Fig. 11.
3. Remove 4 screws securing control box access cover. Remove 3 screws (located in front of the control box access cover) securing condenser coil top cover.
4. Remove screws securing low-voltage access panel. Remove 2 screws inside the 24-v barrier access panel. Tilt sheet metal (located on left side of the 24-v connections) back 45 degrees.
5. Remove screw securing refrigerant service port access panel.
6. Remove 2 U-clips securing 2-row coils together at hairpin end.
7. Remove screws securing two corner posts. Remove two corner posts.
8. Use right corner post to prop up right side of condenser coil top cover. Slide condenser coil partially out of condenser fan housing. See Fig. 37.
9. Use left corner post to prop up left side of condenser coil top cover.
10. Carefully separate the outer coil section 3 to 4 in. from the inner coil section. See Fig. 38.
11. Use a water hose or other suitable equipment to flush down between the 2 coil section to remove dirt and debris. Clean the outer surfaces with a stiff brush in the normal manner.
12. Secure inner and outer coil together with U-clip.
13. Reposition the outer and inner coil section.
14. Reverse the procedure outlined above to reinstall equipment.

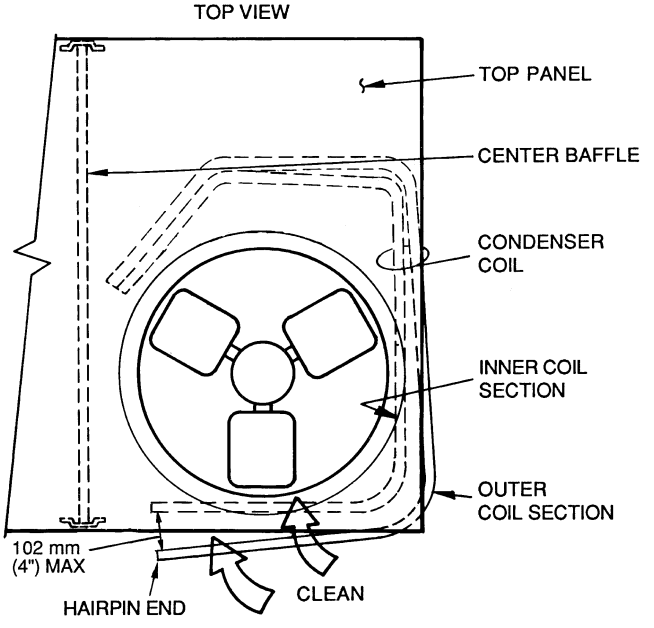


Fig. 38 — Separating Coil Sections

II. LUBRICATION

A. Compressors

Each compressor is charged with correct amount of oil at the factory.

B. Fan-Motor Bearings

Fan-motor bearings are of the permanently lubricated type. No further lubrication is required. No lubrication of condenser- or evaporator-fan motors is required.

III. CONDENSER-FAN ADJUSTMENT (Fig. 39)

Shut off unit power supply. Remove condenser-fan assembly (grille, motor, and fan) and loosen fan hub setscrews. Adjust fan height as shown in Fig. 39. Tighten setscrews and replace condenser-fan assembly.

IV. REFRIGERANT CHARGE

Amount of refrigerant charge is listed on unit nameplate (also refer to Table 1). Unit panels must be in place when unit is operating during charging procedure.

This unit uses a fixed-orifice refrigerant metering device located in the coil header. There is one orifice in each coil circuit. The size of the orifice is stamped on the outside of the tube where the orifice is located. Orifices are factory-selected for optimum performance and are not designed to be changed in the field. To determine if an orifice is plugged, disconnect power to the evaporator-fan motor and start the unit in Cooling mode. Observe the coil for an uneven frost pattern, indicating a plugged orifice.

A. No Charge

Use standard evacuating techniques. After evacuating system, weigh in the specified amount of refrigerant. (Refer to Table 1.)

B. Low Charge Cooling

Using Cooling Charging Charts, Fig. 40-43, vary refrigerant until the conditions of the appropriate chart are met. Note the charging charts are different from type normally used. Charts are based on charging the units to the correct superheat for the various operating conditions. Accurate pressure gage and temperature sensing device are required. Connect the pressure gage to the service port on the suction line. Mount the temperature sensing device on the suction line and insulate it so that outdoor ambient temperature does not affect the reading. Indoor-air cfm must be within the normal operating range of the unit.

C. To Use Cooling Charging Charts

Take the outdoor ambient temperature and read the suction pressure gage. Refer to appropriate chart to determine what suction temperature should be. If suction temperature is high, add refrigerant. If suction temperature is low, carefully recover some of the charge. Recheck the suction pressure as charge is adjusted.

Example: (Fig. 42)

Outdoor Temperature . . . . . 85 F
Suction Pressure . . . . . 80 psig
Suction Temperature should be . . . . . 68 F
(Suction Temperature may vary ± 5 F.)

D. Refrigerant Leaks

Proceed as follows to repair a refrigerant leak and to charge the unit:

1. Locate leak and ensure that refrigerant system pressure has been relieved.
2. Repair leak following accepted practices.

NOTE: Install a filter drier whenever the system has been opened for repair.

3. Add a small charge of R-22 refrigerant vapor to system and leak-test unit.
4. Evacuate refrigerant system if additional leaks are not found.
5. Charge unit with R-22 refrigerant, using a volumetric-charging cylinder or accurate scale. *Refer to unit rating plate for required charge.* Be sure to add extra refrigerant to compensate for internal volume of filter drier.

V. REPLACEMENT PARTS

A complete list of replacement parts may be obtained from your distributor upon request.

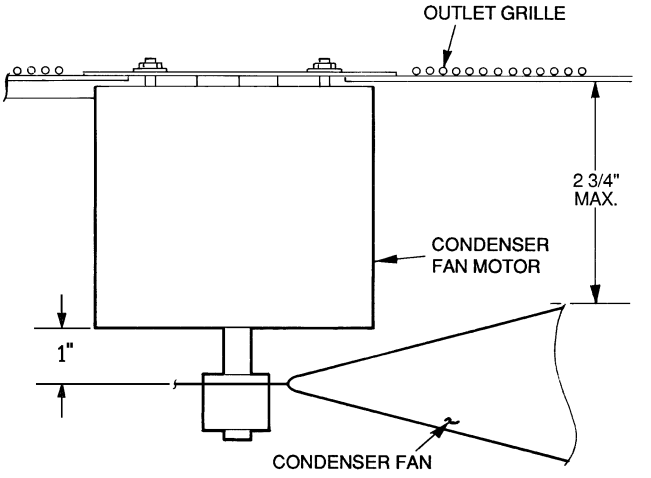


Fig. 39 — Condenser-Fan Adjustment

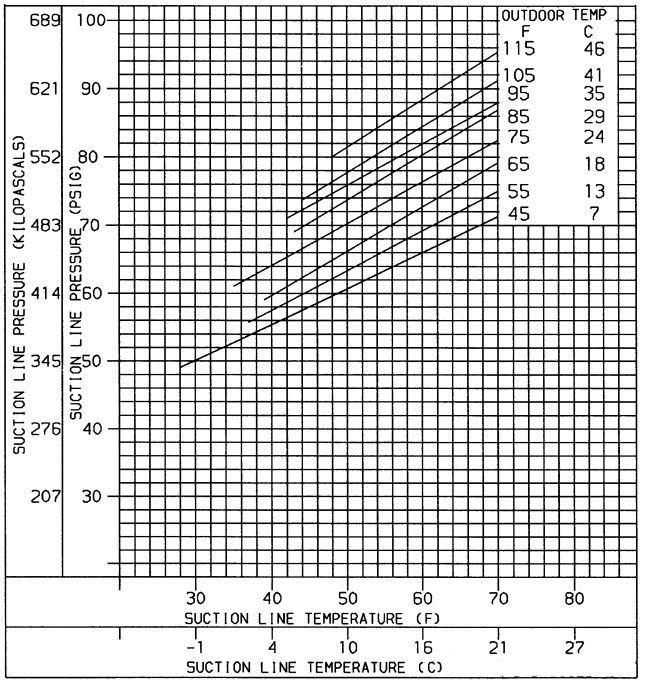


Fig. 40 — Cooling Charging Chart; 558D036

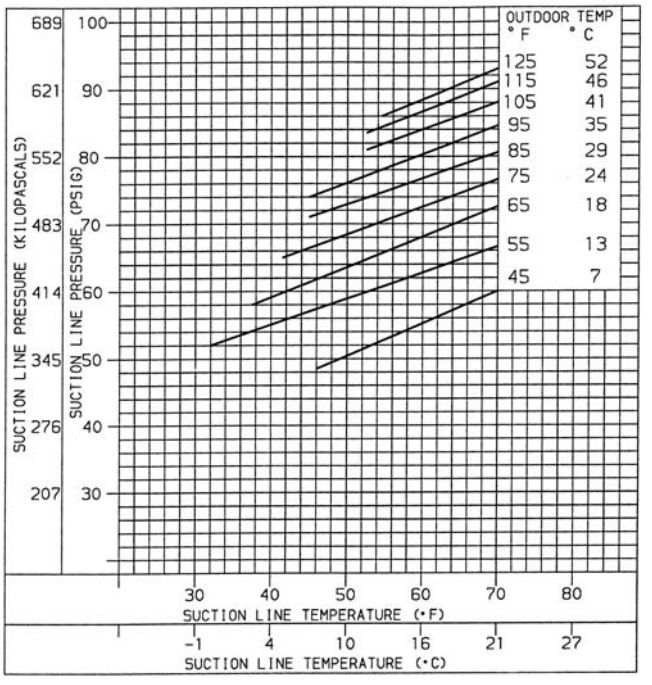


Fig. 42 — Cooling Charging Chart; 558D060

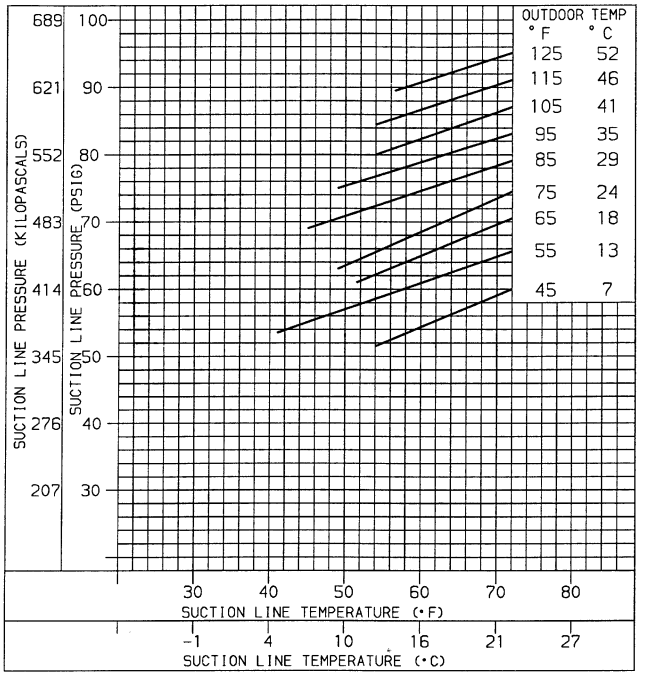


Fig. 41 — Cooling Charging Chart; 558D048

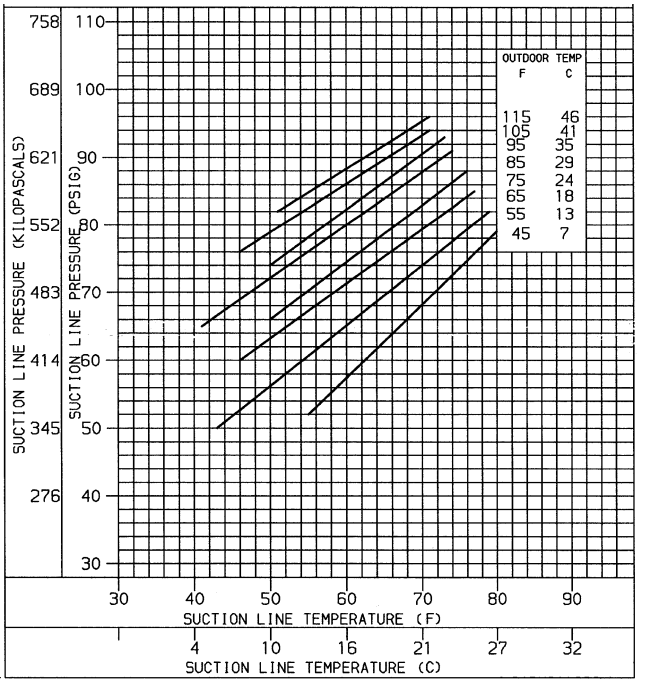


Fig. 43 — Cooling Charging Chart; 558D072

TROUBLESHOOTING

Refer to Tables 19-21 and Fig. 44 for Troubleshooting information.

Table 19 — Cooling Troubleshooting

PROBLEM	CAUSE	REMEDY
Compressor and condenser fan will not start.	Power failure.	Call power company.
	Fuse blown or circuit breaker tripped.	Replace fuse or reset circuit breaker.
	Defective thermostat, contactor, transformer, or control relay.	Replace component.
	Insufficient line voltage.	Determine cause and correct.
	Incorrect or faulty wiring.	Check wiring diagram and rewire correctly.
	Thermostat setting too high.	Lower thermostat setting below room temperature.
Compressor will not start but condenser fan runs.	Faulty wiring or loose connections in compressor circuit.	Check wiring and repair or replace.
	Compressor motor burned out, seized, or internal overload open.	Determine cause. Replace compressor.
	Defective run/start capacitor, overload, start relay.	Determine cause and replace.
	One leg of of 3-phase power dead.	Replace fuse or reset circuit breaker. Determine cause.
Compressor cycles (other than normally satisfying thermostat).	Refrigerant overcharge or undercharge.	Recover refrigerant, evacuate system, and recharge to nameplate.
	Defective compressor.	Replace and determine cause.
	Insufficient line voltage.	Determine cause and correct.
	Blocked condenser.	Determine cause and correct.
	Defective run/start capacitor, overload, or start relay.	Determine cause and replace.
	Defective thermostat.	Replace thermostat.
	Faulty condenser-fan motor or capacitor.	Replace.
	Restriction in refrigerant system.	Locate restriction and remove.
Compressor operates continuously.	Dirty air filter.	Replace filter.
	Unit undersized for load.	Decrease load or increase unit size.
	Thermostat set too low.	Reset thermostat.
	Low refrigerant charge.	Locate leak; repair and recharge.
	Leaking valves in compressor.	Replace compressor.
	Air in system.	Recover refrigerant, evacuate system, and recharge.
	Condenser coil dirty or restricted.	Clean coil or remove restriction.
Excessive head pressure.	Dirty air filter.	Replace filter.
	Dirty condenser coil.	Clean coil.
	Refrigerant overcharged.	Recover excess refrigerant.
	Air in system.	Recover refrigerant, evacuate system, and recharge.
	Condenser air restricted or air short-cycling.	Determine cause and correct.
Head pressure too low.	Low refrigerant charge.	Check for leaks; repair and recharge.
	Compressor valves leaking.	Replace compressor.
	Restriction in liquid tube.	Remove restriction.
Excessive suction pressure.	High heat load.	Check for source and eliminate.
	Compressor valves leaking.	Replace compressor.
	Refrigerant overcharged.	Recover excess refrigerant.
Suction pressure too low.	Dirty air filter.	Replace filter.
	Low refrigerant charge.	Check for leaks; repair and recharge.
	Metering device or low side restricted.	Remove source of restriction.
	Insufficient evaporator airflow.	Increase air quantity. Check filter and replace if necessary.
	Temperature too low in conditioned area.	Reset thermostat.
	Outdoor ambient below 25 F.	Install low-ambient kit.
Evaporator fan will not shut off. (Sizes 036-060 only.)	Time off delay not finished.	Wait for 30-second off delay.
Compressor makes excessive noise (558D072 scroll only).	Compressor rotating in wring direction.	Reverse the 3-phase power leads as described in Start-Up section, page 17.

Table 20 — Durablade Economizer Troubleshooting

PROBLEM	CAUSE	REMEDY
Damper does not open.	Indoor (evaporator) fan is off.	1. Check to ensure that 24 vac is present at terminal C1 on the IFC or that 24 vac is present at the IFO terminal. Check whether 24 vac is present at PL6-1 (red wire) and/or PL6-3 (black wire). If 24 vac is not present, check wiring (see unit label diagram). 2. Check proper thermostat connection to G on the connection board.
	No power to economizer motor.	1. Check that SW3 is properly making contact with the damper blade. Check that SW1 is in the NC (normally closed) position. 2. Check diode D18. If diode is not functioning properly, replace D18. 3. Confirm that the economizer control board is grounded properly at PL6-4 (brown wire) and at brown terminal of the economizer control board (brown wire). The economizer motor must also be grounded properly at the negative motor terminal (brown wire). 4. Verify SW1 and SW3 are working and wired properly (see unit label diagram). 5. Check for 24 vac input at both PL6-1 (red wire) and PL6-3 (black wire). If 24 vac not present, check unit wiring (see unit label diagram). If 24 vac is found in both places, check for 24 vac at the yellow terminal of the economizer control board (yellow wire). If 24 vac power is not present, replace the economizer control board.
	Economizer motor failure.	If the indoor (evaporator) fan and economizer motor are energized, verify that there is a minimum of 18 vdc at the positive motor terminal. If the motor is not operating, replace the motor.
Economizer operation limited to minimum position.	OAT or EC set too high.	1. Set at correct temperature (3 F below indoor space temperature). 2. Check OAT or EC by setting above outdoor temperature or humidity level. If the OAT or EC switches do not close, replace OAT or EC.
	Verify economizer control board is correctly wired and works properly.	1. Perform the following tests when OAT or EC is closed, Y1 is called for and damper is at minimum position. Confirm 24 vac on gray terminal of the economizer control board (gray wire). If 24 vac is not present, check wiring (see unit label diagram). 2. Verify that SW1 and SW3 are wired correctly and working properly (see unit label diagram). 3. Check to ensure that 24 vac exists at PL6-2 (blue wire). If 24 vac is not present, check wiring (see unit wiring label diagram). 4. Check 24 vac output at PL6-10 (white wire). If 24 vac is not present, replace economizer control board.
	Check SAT.	1. After verifying that the OAT and EC settings and the economizer control board wiring are correct, check to ensure that the 24 vac terminal of the SAT has 24 vac (white wire). If OAT, EC, and control board are functioning and wired properly and no 24 vac exists, check wiring (see unit label diagram). 2. If supply-air temperature is greater than 57 F, 24 vac should be found at terminal T2 on the SAT (pink wire). If 24 vac is not present, replace SAT.
Damper does not close.	Incorrect wiring of economizer.	1. Verify that SW2 and SW4 are wired and working properly (see unit label diagram). 2. Check diode D19. If diode is not functioning properly, replace D19.
	Verify economizer control board is functioning properly.	1. After verifying that the wiring is correct, modulate the damper to the minimum position. Remove the calls for G. 2. If the damper does not move, check for 24 vac at PL6-1 (red wire). If 24 vac is not present, check wiring (see unit label diagram). 3. If damper still does not move, check for 24 vac at blue terminal of economizer control board (blue wire). If 24 vac is not present, replace the economizer circuit board.
	Check SAT.	1. After verifying that the wiring is correct and the economizer control board is functioning properly, place the OAT or EC switch in the closed position. Place a call for Y1 and open the damper to the fully open position. Confirm that the 24 vac terminal of the SAT has 24 vac (white wire). If 24 vac is not present, check wiring (see unit label diagram). 2. If supply-air temperature is less than 52 F, 24 vac should be found at terminal T1 on the SAT (violet wire). If 24 vac not found, replace SAT.
	Economizer motor failure.	If economizer control board and SAT are functioning properly, verify that there is a minimum of 18 vdc at the positive motor terminal. If a minimum of 18 vdc is present and the motor is still not operating, replace the motor.
Economizer damper does not close on power loss.	Verify that close-on-power-loss and economizer control board are functioning properly.	1. Check voltage potential across batteries. If lower than 14 vdc, replace close-on-power-loss power supply (9-v alkaline batteries). It is recommended that you check this emergency power supply on a regular basis or whenever the filters are changed. 2. If the close-on-power-loss and economizer control board are functioning properly, check for 14 vdc or higher at the blue terminal of the economizer control board (blue wire) when power is disconnected from unit. If 14 vdc is not present, replace the control board.

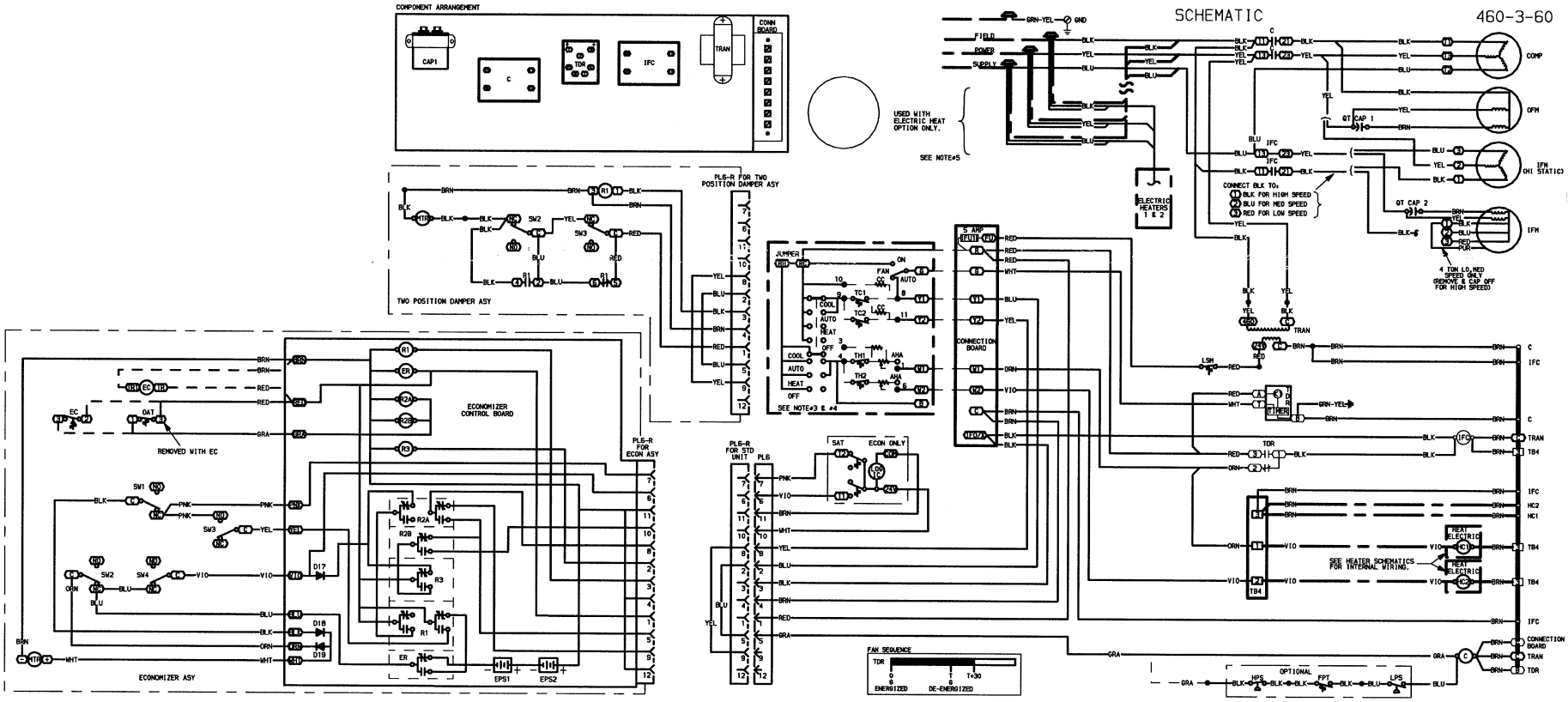
LEGEND

C1 — Common Power
EC — Enthalpy Control
IFC — Indoor (Evaporator) Fan Contactor
IFO — Indoor (Evaporator) Fan On
OAT — Outdoor-Air Thermostat
PL — Plug
SAT — Supply-Air Thermostat
SW — Economizer Position Switch

Table 21 — PARABLADE Economizer Troubleshooting

PROBLEM	CAUSE	REMEDY
Damper does not open.	Evaporator fan not on.	Check wiring between G on connection board and indoor (evaporator) fan contactor.
	No power to economizer motor.	1. Disconnect power at TR and TR1. Disconnect jumper across P and P1. 2. Connect jumper across TR and 1. 3. Connect jumper across T1 and T. 4. If connected, remove enthalpy sensor from terminals S_O and +. 5. Apply power (24 vac) to terminals TR and TR1. The LED should be off and the damper should be in the closed position. 6. Disconnect the factory-installed 620 ohm resistor from terminals S_R and +. The LED should light up and the motor should drive towards open. If this does not happen, replace the economizer control module.
	Economizer motor failure.	If the indoor (evaporator) fan and economizer motor are energized, verify that there is a minimum of 24 vac at terminals TR and TR1. If the motor is not operating, replace the motor.
Economizer operation limited to minimum position.	Economizer control module failure.	1. To simulate high or low enthalpy, reconnect the factory-installed 620 ohm resistor across terminals S_R and +. 2. Connect 1.2 Kohm checkout resistor across terminals S_O and +. Turn the enthalpy set point to ''A.'' The LED should turn on, indicating low enthalpy. The motor should drive towards open. If LED does not light, replace module. If motor does not drive open, check motor operation. 3. Turn the enthalpy set point to ''D.'' The LED should turn off, indicating high enthalpy. The motor should drive towards closed. If these actions do not occur, replace module. 4. Disconnect 1.2 Kohm checkout resistor before resuming operation.
Damper does not close.	No power to economizer.	1. Disconnect power at TR and TR1. Disconnect jumper across P and P1. 2. Connect jumper across TR and 1. 3. Connect jumper across T1 and T. 4. If connected, remove enthalpy sensor from terminals S_O and +. Factory-installed 620 ohm resistor should be connected to terminals S_R and +. 5. Apply power (24 vac) to terminals TR and TR1. The LED should be off and the damper should be in the closed position. 6. Disconnect the factory-installed 620 ohm resistor from terminals S_R and +. The LED should light up and the motor should drive towards open. If this does not happen, replace the economizer control module.
	Spring return failure.	If power to unit is off and damper does not close, check for a bound linkage. If linkage is not bound, then internal spring may be broken. Replace actuator.
	Economizer motor failure.	If the economizer control module is functioning properly, verify that there is a minimum of 24 vac at terminals TR and TR1. If the motor is not operating, replace the motor.
Damper does not open or close according to enthalpy readings.	Sensor incorrectly wired or bad.	To verify sensor operation, reconnect the + lead of the outdoor enthalpy sensor to the + terminal of the economizer control module. Connect a DC milliammeter between terminals S_O of the economizer control module and terminals S of the enthalpy sensor. The milliammeter should indicate between 3 and 25 mA if the sensor is operating properly. If the milliammeter indicates 0, the sensor may be wired backwards. If any other readings are shown, replace the sensor.

LED — Light-Emitting Diode



LEGEND

AHA	—	Adjustable Heat Anticipator
C	—	Contactor, Compressor
CAP	—	Capacitor
CC	—	Cooling Compensator
COMP	—	Compressor Motor
D	—	Diode
EC	—	Enthalpy Control
ECON	—	Economizer
EPS	—	Emergency Power Supply (Nine Volt Battery)
ER	—	Economizer Relay
FPT	—	Freeze Up Protection Thermostat
FU	—	Fuse
GND	—	Ground
HC	—	Heater Contactor (Strip Heat)
HPS	—	High Pressure Switch
IFC	—	Indoor Fan Contactor
IFM	—	Indoor Fan Motor
LPS	—	Low Pressure Switch
LSM	—	Limit Switch (Manual Reset)
MTR	—	Motor
OAT	—	Outdoor Air Thermostat
OFM	—	Outdoor Fan Motor
PL	—	Plug Assembly
QT	—	Quadruple Terminal
R	—	Relay
SAT	—	Supply Air Thermostat
SEN	—	Sensor
SW1	—	Switch Fully Open
SW2	—	Switch Fully Closed
SW3	—	Switch Min. Vent Position
SW4	—	Switch Max. Vent Position
TB	—	Terminal Block
TC	—	Thermostat-Cooling
TDR	—	Time-Delay Relay
TH	—	Thermostat-Heating
TRAN	—	Transformer

Field Splice
Marked Wire
Terminal (Marked)
Terminal (Unmarked)
Terminal Block
Splice
Splice (Marked)
Factory Wiring
Field Control Wiring
Field Power Wiring
Accessory or Optional Wiring
To indicate common potential only. Not to represent wiring.

NOTES:
1. If any of the original wire furnished must be replaced, it must be replaced with type 90 C wire or its equivalent.
2. Three-phase motors are protected under primary single phasing conditions.
3. Thermostat:
   HH07AT170, 172, 174 & P272-2783
   Subbase:
   HH93AZ176, 178 & P272-1882, 1883
4. Set heat anticipator at 1 amp.
5. Use copper conductors only.
6. Use copper, copper clad aluminum or aluminum conductors.

Fig. 44 — Typical Wiring Schematic

Packaged Service Training programs are an excellent way to increase your knowledge of the equipment discussed in this manual, including:

- Unit Familiarization
- Installation Overview
- Maintenance
- Operating Sequence

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START-UP CHECKLIST
(Remove and Store in Job File)

I. PRELIMINARY INFORMATION

MODEL NO.: _____ SERIAL NO.: _____

DATE: _____ TECHNICIAN: _____

II. PRE-START-UP (insert checkmark in box as each item is completed)

☐ VERIFY THAT CONDENSATE CONNECTION IS INSTALLED AS SHOWN IN THE INSTALLATION INSTRUCTIONS

☐ CHECK ALL ELECTRICAL CONNECTIONS AND TERMINALS FOR TIGHTNESS

☐ CHECK THAT INDOOR AIR FILTERS ARE CLEAN AND IN PLACE

☐ VERIFY THAT UNIT INSTALLATION IS LEVEL WITHIN TOLERANCES LISTED IN THE INSTALLATION INSTRUCTIONS

☐ CHECK FAN WHEEL AND PROPELLER FOR LOCATION IN HOUSING/ORIFICE AND SETSCREW TIGHTNESS

☐ CHECK PULLEY ALIGNMENT AND BELT TENSION: REFER TO INSTALLATION INSTRUCTIONS

III. START-UP

ELECTRICAL

SUPPLY VOLTAGE L1-L2 _____ L2-L3 _____ L3-L1 _____

COMPRESSOR AMPS L1 _____ L2 _____ L3 _____

INDOOR FAN AMPS L1 _____ L2 _____ L3 _____

TEMPERATURES

OUTDOOR-AIR TEMPERATURE _____ DB

RETURN-AIR TEMPERATURE _____ DB _____ WB

COOLING SUPPLY AIR _____

PRESSURES

REFRIGERANT SUCTION _____ PSIG

REFRIGERANT DISCHARGE _____ PSIG

☐ VERIFY REFRIGERANT CHARGE USING COOLING CHARGING CHARTS ON PAGE 31

☐ VERIFY THAT 3-PHASE SCROLL COMPRESSOR IS ROTATING IN CORRECT DIRECTION (558D072 ONLY)

CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE

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